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The Royal Institute of British Architects.

INCORPORATED SEVENTH OF WILLIAM IV. AND FIFTIETH OF VICTORIA.

THE SESSION 1888-89.

THE OPENING MEETING of the Session was held on Monday, 5th November 1888, when Mr. ALFRED WATERHOUSE, R.A., delivered his Presidential Address,* in which he alluded to the Examination (no longer voluntary, but obligatory) as an immense stride in the right direction—first, as an incentive to study, and, secondly, as showing the course in which such study should be directed. “There has hitherto been,” he said, “not so much a want of will to study diligently, as an uncertainty as to the way. “The way is now made clear, and from the commencement of his articles “the student of the future will know, if he cares to know, what he has to “make for, and accomplish, before he can be recognised either by himself “or others as one fit to practise as an architect.”

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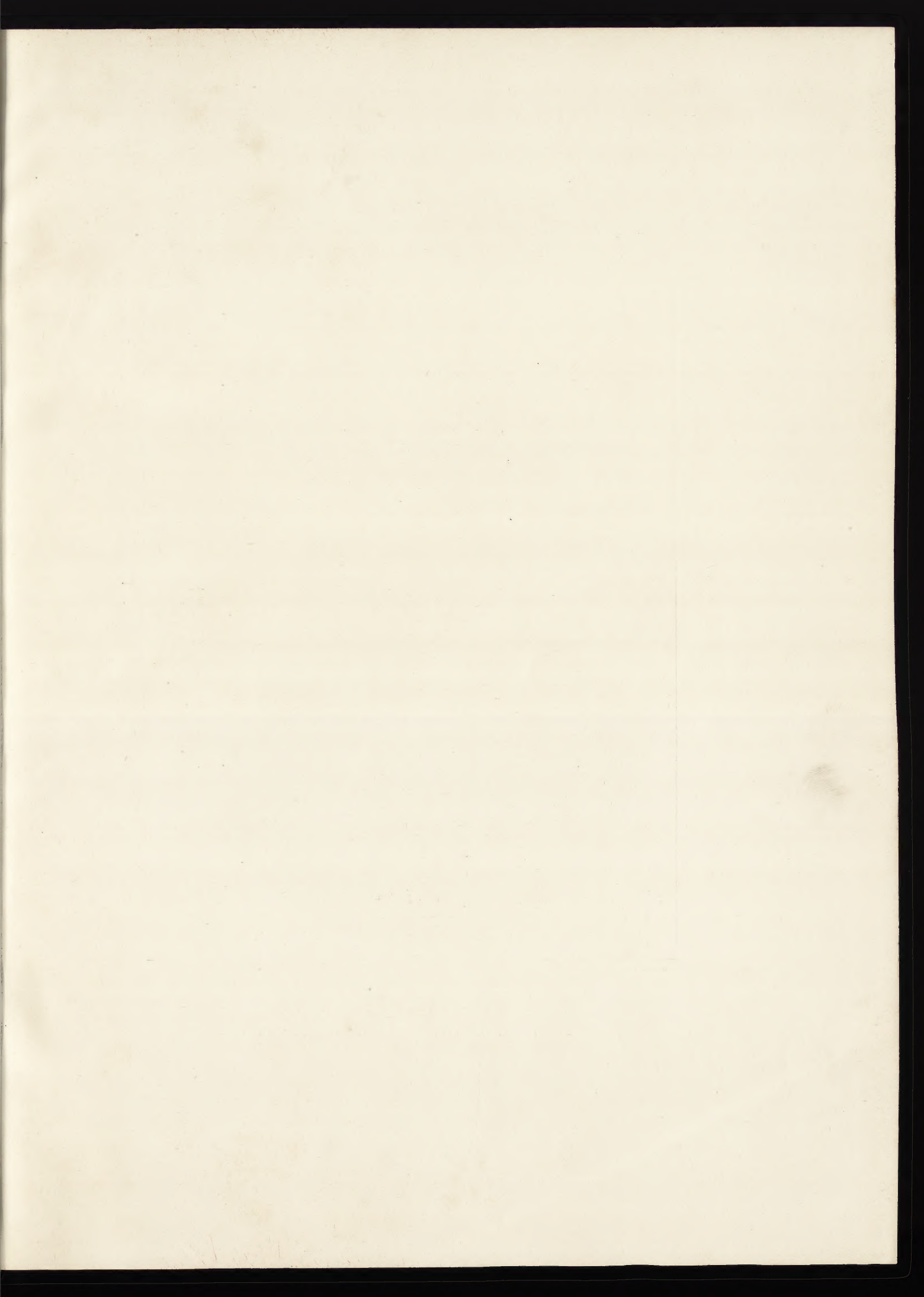
Having alluded to the By-laws authorising the alliance of non-metropolitan Societies with the Institute, expressing his opinion that they would be taken

* The Address, in its entirety, is printed in JOURNAL OF PROCEEDINGS, Vol. V., pp. 17-29.



TRANSACTIONS
OF
THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.
VOL. V. NEW SERIES, 1889.

Seventeen hundred and fifty copies of this Volume have been printed for the use of the members of the Royal Institute, and for that of Allied and other kindred Societies, Public Libraries, and Educational Institutions, throughout the British Empire and in Foreign Countries.



THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

Incorporated Seventh of William IV. and Fiftieth of Victoria.



HARE, SC.

GEORGE EDMUND STREET, R.A.

PRESIDENT IN 1881. ROYAL GOLD MEDALLIST.

The Royal Institute of British Architects

INCORPORATED SEVENTH OF WILLIAM IV. AND FIFTIETH OF VICTORIA

TRANSACTIONS: VOL. V. NEW SERIES

FIFTY-FIFTH YEAR OF FOUNDATION

USUI CIVIUM DECORI URBIIUM

LONDON

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1889

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advantage of to the general good of the profession, the PRESIDENT referred to the new Local Government Act, which made no provision for the proper examination of technical officers employed by the Urban and Rural Authorities, although this defect had been pointed out by the Council, whose recommendations he hoped, when the Act came to be amended, would be listened to.

The Imperial Institute promised, he thought, to be a very imposing structure, though, had it been placed on the north side of a square, instead of being set back from a road ninety feet wide, its effect would have been enormously enhanced. The PRESIDENT considered that things were better ordered abroad in this respect, and he contrasted the sites of the Palace of Justice at Brussels, and of the Parliament Houses at Vienna, with that of the Royal Courts of Justice in London. On the other hand, the domestic buildings of this country, he held, were without rivals elsewhere; and he invited comparison of an English country-house, designed by any English architect of reputation for such work, with a modern French château—even with the published ideal of VIOLLET-LE-DUC—when the superiority of the English work would be evident.

The PRESIDENT next referred to schemes for the improvement of communication in London, which too often left much to be desired; and went on to state that the question of rights of light and air was pre-eminently a subject for the attention of the Institute; “and surely,” said the PRESIDENT, “if it were gone about in the right way, and with sufficient energy, an Act might be passed removing, to a certain extent at any rate, one of the “greatest sources of annoyance and expense incident to building in towns.”

In dealing with the obituary for the twelve months, Mr. WATERHOUSE mentioned January as a fatal month, the Institute having lost Mr. GEORGE GODWIN, *Past Vice-President*, on the 27th; Mr. T'ANSON, *President*, and M. QUESTEL, *Hon. Corr. Member.*, on the 30th. The career of GEORGE EDMUND STREET and that of HENRY HOBSON RICHARDSON, of Boston (United States), were then eulogistically referred to at some length, and their biographies described as those of two of the most remarkable modern architects, and therefore of great interest. Among other literary works mentioned by the PRESIDENT, Professor T. HAYTER LEWIS'S *Holy Places of Jerusalem*, Mr. R. PHENÉ SPIERS'S *Architectural Drawing*, and the *Travels in Tunisia* by Mr. ALEX. GRAHAM and Mr. H. S. ASHBEE, were alluded to.

The PRESIDENT, having enumerated several questions fit to be submitted for the consideration of the new London County Council, said that there were other questions, of like importance, which architects could settle of their own

free will—questions of honourable professional practice; and, after alluding to the first Address of his immediate predecessor, who urged members to reflect that the Institute and the profession were in principle one and the same force, he maintained that the first duty of the Corporate Body was “to guard the honour of the profession—to take care that its members do nothing derogatory to their profession; or, at the worst, that they shall not do so with impunity.” “I mean,” said the PRESIDENT, “that when any of us undertake duties of public trust, whether it be in an honorary or a paid capacity, in any office or on any Council or Board, we ought to scrupulously avoid using our position for any private ends or gains, whether as professional men or as individuals.”

The PRESIDENT then quoted the following words, used by the late Mr. WHICHCORD at the opening of the Session for 1879-80, in reference to the Metropolitan Board of Works:—“Architects,” said he, “may be elected members of that Board, just as barristers, solicitors, and doctors may be so elected. It would be ridiculous to say that professional men shall not sit at that Board because they may have had a pecuniary interest in some of its building transactions. But I shall run no risk of censure when I say that a Fellow or an Associate of this Institute, if he be elected a member of the Metropolitan Board of Works, ought not, from that moment, to have any professional connection whatever with the purchase of land offered for sale or lease by the Board; nor should he be professionally engaged in the superintendence of buildings to be erected on land which is the property of ratepayers, whose agent and representative he is.”

After referring to other matters of interest, including architectural competitions, the question of Bills of Quantities, the arbitration clauses of the *Heads of Conditions of Building Contracts*, the PRESIDENT referred to the subject of Restoration, considering that reverence for the excellence of one's forefathers' work, and delight in what had been superadded to that excellence by the finger of Time, was a characteristic of the present age. There were, unfortunately, not many buildings left upon which the architect and workman could show their reverence. It might be right to enlarge, or even pull down old work, but never to endeavour to make old work look like new. Occasionally old work might be replaced, as SCOTT had done at St. David's and as Mr. PEARSON was doing at Westminster Hall; but such cases were exceptional. It was certain that the past had not respected its own past in the same manner, and the present practice, commendable as it was, had its dangers. Dwelling on the past would not produce self-reliance,

and without self-reliance bold originating architects could not be expected. The Greeks had spent their powers in perfecting their own work, not in resuscitating dead styles; the men of the Middle Ages in the marvellous development of their own phase of architecture. The Renaissance artists, in spite of their name, had been originators. It had been left to the present age to copy, or, as M. DALY had put it, "to pillage ancient monuments." Was it not necessary to consider the question seriously, and ask to what good end this eternal copying or adaptation was to lead? In America they were shaking themselves free from it; and were Americans to monopolise the guidance of common sense in architecture? Might not Englishmen make greater efforts to express the purpose of their work in a language of their own? The architecture of the Past might be loved and revered, but architects should not forget that archæology was the bane of living progressive art, and that if architecture was ever again to evoke popular enthusiasm it would do so by embodying the thoughts, the aspirations, and the genius of the living people for whose use it was intended.

The PRESIDENT concluded by expressing the hope "that we may all, both "in our private practice and as members of this Body corporate, do our "utmost to give our art a firmer hold on public admiration and attention, "and make our profession respected by all with whom we come in contact, "so that every member of the Royal Institute of British Architects, whether "his work be lovely or not, may at any rate show in his life the things that "are honest and of good report."

THE PRESENTATION OF PRIZES took place on Monday, 28th January 1889, when the PRESIDENT delivered to the assembled students an Address,* wherein he compared the opportunities of the present day with the blind and uncertain fashion in which, in his early days, students endeavoured to learn their art. They now knew what books to read, what buildings to study, what lectures to attend; and it would be for them in due course to express in brick and stone the thoughts and aspirations of their

* This Address, in its entirety, is printed in JOURNAL OF PROCEEDINGS, Vol. V., pp. 125-29.

fellow-countrymen. Their art must be their own, and their buildings must embody the requirements of those for whom they were built. The evils of competitions were numberless, but they were often the young architect's opportunity. Much had been done by the Institute to guard against the abuses formerly attendant upon them, and the agreement not to compete unless an assessor be appointed was a great step in the right direction. The instructions to competitors should be clear, and, above all, should not insist on non-essentials. Excellent designs had been set aside, merely for doing what obviously ought to have been done, but thereby transgressing unwisely-strict instructions. When the designs came in, this mistake in the instructions might be clear enough; yet the assessors and promoters had no alternative but to adhere rigidly to them in making the award. It would be well if competitors endeavoured, in imagination, to put themselves in the place of an assessor. After discovering and laying aside those designs which did not adhere to the instructions, the assessor would probably note those in which there were evidences of false or careless construction. He would probably find some in which the staircases would not carry the occupants of the building from one storey to another. This was not uncommonly the case, even in ambitious designs. Chimney-breasts, also, frequently made strange vagaries in their way from floor to floor, finding themselves at a distance of many feet, measured horizontally, from where they had been on the floor below—perhaps, because the rooms they served had to be of different superficies on one storey from those on another. Such defects testified to carelessness, or to something worse; assessors were bound to note them and let them tell against the designs in question. Therefore, when the designs which conformed to the instructions, and which were honest and careful in construction, had been selected, they would, perhaps, be found to be but few as compared to the original number. It was on the former that the assessor had to exercise his judgment, weighing their merits and defects of plan, lighting, fitness for the purpose to which the structure was to be devoted, beauty in proportion and detail—in a word, their general excellence.

It was always best, the PRESIDENT said, not to allow the elevations to claim attention before the plans, but to arrange the accommodation to the best advantage in the first place, and not to leave the plan until a perfect arrangement had been secured. The architect should think of himself as an occupant of each room, and put doors, windows, and fireplace as he would like them for his own use and convenience. Every room should be approached by direct, well-lighted corridors and staircases, as broad as the occasion required,

and no broader; it was as great a fault to throw away space uselessly—that is to say, when neither needed for convenience nor effect—as it was to be without it where it was required for those purposes. Nothing so much spoilt an otherwise good plan as ill-arranged corridors, which were the parts of the building seen by every one who entered it, and the PRESIDENT recommended students to picture the corridors to themselves from the very beginning of their studies. The parts of a corridor most seen were, of course, its ends; and if a studied arrangement were wanted anywhere, it was at those points of the design which were directly before the eyes of everybody passing to and fro. The Gothic builders had understood this, for the aisles of most of their churches terminated in a beautiful window filled with stained glass, designed to be seen at a distance. The end of a vista should not only receive most careful study, but, if possible, it should be so arranged that, except when occupied by a window, the light should fall more strongly on the termination of the corridor than on intermediate parts. Nor should the latter escape attention, but should be everywhere well lighted, though not monotonously so. Architectural effect, it should be remembered, when polychromy was not trusted to, depended entirely on the skilful contrast of light and shade. In the admission of daylight and the arrangement of artificial light the most exquisite detail was entirely thrown away if the building were deprived of all shade. A very simple passage, divided by arches into bays, always looked well if the alternate bays only were lighted, while the effect was greatly diminished by introducing windows and gaslights into each bay. Again, it was desirable to keep the brightest lights for the apartments, staircases, and other parts which were dignified with the architect's most elaborate efforts, and to those rooms where the brightest light was essential, which would appear all the brighter if the way to them were kept in subdued light. Although that was one of the great secrets of the successful treatment of interiors, such was the horror of gloom in the public mind, at present, that the rule should be applied with caution, or those who came after might let in light where it was never intended—in fact, might light up brilliantly the more uncomely parts and make shipwreck of a studied effect. No fancied requirements of style in the design of a structure should be allowed to be an inducement to put windows in the wrong place with regard to the ceilings and floors, to omit them where required, or to put in sham windows from a supposed need for symmetry. There were instances of semi-circular windows being brought down close to the floor, and kept many feet from the ceiling, in buildings of pretension. If a competitor adopted such a

treatment for other than store or lumber rooms it might go hard with him before some assessors.

As an instance of a great and remarkable competition, the PRESIDENT referred to that for the new west front of Milan Cathedral, in which elaborate preparations were made for a fair and impartial adjudication. The first programme had been published in March 1886, and it was accompanied by a book containing plans, elevations, and sections of the existing fabric [Illustrn. i.]. The Jury had met at Milan, in May 1887, to view the designs submitted by the 120 competitors. Seven days had been spent by the Jury in the examination of those designs, and in conference thereon, in the large room of the Brera. Fifty of the more meritorious designs had been chosen on the third day by open vote, then the number was reduced to twenty-six, and finally, by secret voting, to fifteen—the number to which the second competition was to be restricted. The second programme was issued to the fifteen selected competitors in July 1887, and each was asked that his final design should conform with the organic structure of the actual edifice, with its style and its decorative character. All who were familiar with the Duomo knew that it owed its fame to its material, vast size, homogeneity, and richness of pinnacle and statuary, rather than to its architectural qualities or its purity of style. Still, it had a style of its own; and, however little it might be wished that the style should be developed elsewhere, the Jury had been right in requiring that the new front should have reference as much as possible to what was behind it in its peculiarities of structure and detail. On that account—and on that account alone—the Jury had felt compelled to put Mr. DANIEL BRADE'S design out of court. That design [Illustrn. ii.] seemed to the PRESIDENT to have almost everything to recommend it except its want of conformity with the sectional lines of the actual building—a fault which would have been glaringly apparent when seen from the N.E. or S.E. Otherwise the design of the double tiers of arcade above the side portals, of the portals themselves, and of the flanking campanile, in vigour and purity of detail, as well as in the execution of the drawings themselves, did full credit to English art and draughtsmanship. Mr. BRADE'S design possessed, in Mr. WATERHOUSE'S opinion, a masculine beauty which removed it far from the other competitors' designs. The Jury, however, having decided that the characteristics of the existing building should be emphasised, had very properly taken exception to Mr. BRADE'S second design; and that was another instance of how absolutely necessary it was in competitions to be guided by the instructions, even if those instructions went against one's individual judgment—which might possibly sometimes be



better than that of the judges. Of the other designs, the first premiated design [Illustn. iii.] conformed most nearly to the lines of the original cathedral. It perfectly expressed and emphasised those lines, and the portals were imposing. It was the work of Signor BRENTANO, and any faults of detail in his design were those of the existing edifice, though when seen not backed up by the transepts, as in the geometric elevation, its outline perhaps looked somewhat meagre and unsatisfactory. Another design, placed second, impressed chiefly by its graceful campanile. In recasting the façade, it had become necessary to remove the three Renaissance portals and the windows above them, designed by PELLEGRINI, afterwards architect of the Escorial. Those features the PRESIDENT thought most people regarded as the best portion of the existing work; and one of the competitors, Signor BELTRAMI, had given not only his notion of the way in which the front should be treated so as to marry with the rest of the edifice, but, by adding a detached campanile to the south-west of the Duomo—just opposite the entrance to the recently-built *Galleria*—he had shown how all those beautiful features of PELLEGRINI and his successors could be worked in again [see elevation]; and how the campanile, by serving as a pendant to





THE WEST FRONT OF THE CATHEDRAL

See p.



OF MILAN, AS IT IS AT PRESENT.



THE PRESIDENT'S ADDRESS TO STUDENTS (ii).



REJECTED DESIGN FOR THE WEST FRONT OF THE CATHEDRAL OF MILAN.

By MR. DANIEL BRADÉ, *Fellow* (Kendal).







THE ACCEPTED DESIGN FOR THE WEST FRONT

By SIGNOR L.



FRONT OF THE CATHEDRAL OF MILAN.

ANTANO (Milan).



THE PRESIDENT'S ADDRESS TO STUDENTS (iv).



PREMIATED DESIGN FOR THE WEST FRONT OF THE CATHEDRAL OF MILAN.

By M. DEPERTHES (Paris).



THE PRESIDENT'S ADDRESS TO STUDENTS (v).



PREMIATED DESIGN FOR THE WEST FRONT OF THE CATHEDRAL OF MILAN.

By HERR DICK (Vienna).



the *Galleria*, would prevent its enormous size appearing to crush the Duomo, as it did at present. This work of Signor BELTRAMI was beyond the instructions, but it had not in any way contravened them, and it had therefore been thought that it might be mentioned with the favour it deserved in the report of the jurors. The design by Monsieur DEPERTHES [Illustrn. iv.] and that by Herr DICK [Illustrn. v.] represented respectively the work of a Parisian and of a Viennese architect. The competition had been eminently an international trial; and the Milanese, the PRESIDENT thought, deserved great credit for their zeal and good intentions in this matter, and for the evidently fair and loyal way in which the arrangements of the competition had been carried out.*

The PRESIDENT summed up what he had to say about competitions by calling attention to the opportunity they presented for the practice of the most scrupulous honesty. The architect must, of course, live in an honest atmosphere; he must remember that his drawings are but means to an end; he would therefore not allow his design to give an appearance of detail he did not intend to realise. His perspective views would show his building as it actually would appear from a given point of view, the more distant parts not being raised up unduly to show well above the nearer features. He must suppress nothing, exaggerate nothing. The cubical contents must be accurately given, the prices attached—reasonable prices. The PRESIDENT would not have it thought that he was merely taking the low standard of “Honesty is the best policy,” which might be true—he believed it was. But what he desired to urge was the extreme importance of architects breathing the air of accuracy, so that they might neither deceive themselves nor other people. The conditions of most competitions now demanded one or more perspective views—and very wisely. The architect himself did not know exactly how his building would look from a certain point until he had drawn it in perspective; and students should accustom themselves to design in perspective. An architect, engaged upon the design of a building, should always try to realise the effects it would be likely to produce, both inside and outside, from given points. While making the plans the roof should be thought of; and the walls arranged, where possible, so that the roof might be simple, strong, inexpensive, and effective. For the English architect, owing to the climate, there was nothing more important in point of effect than the sky-line, which should always on that account be most carefully studied.

After having carefully examined ancient examples of repute, so as to

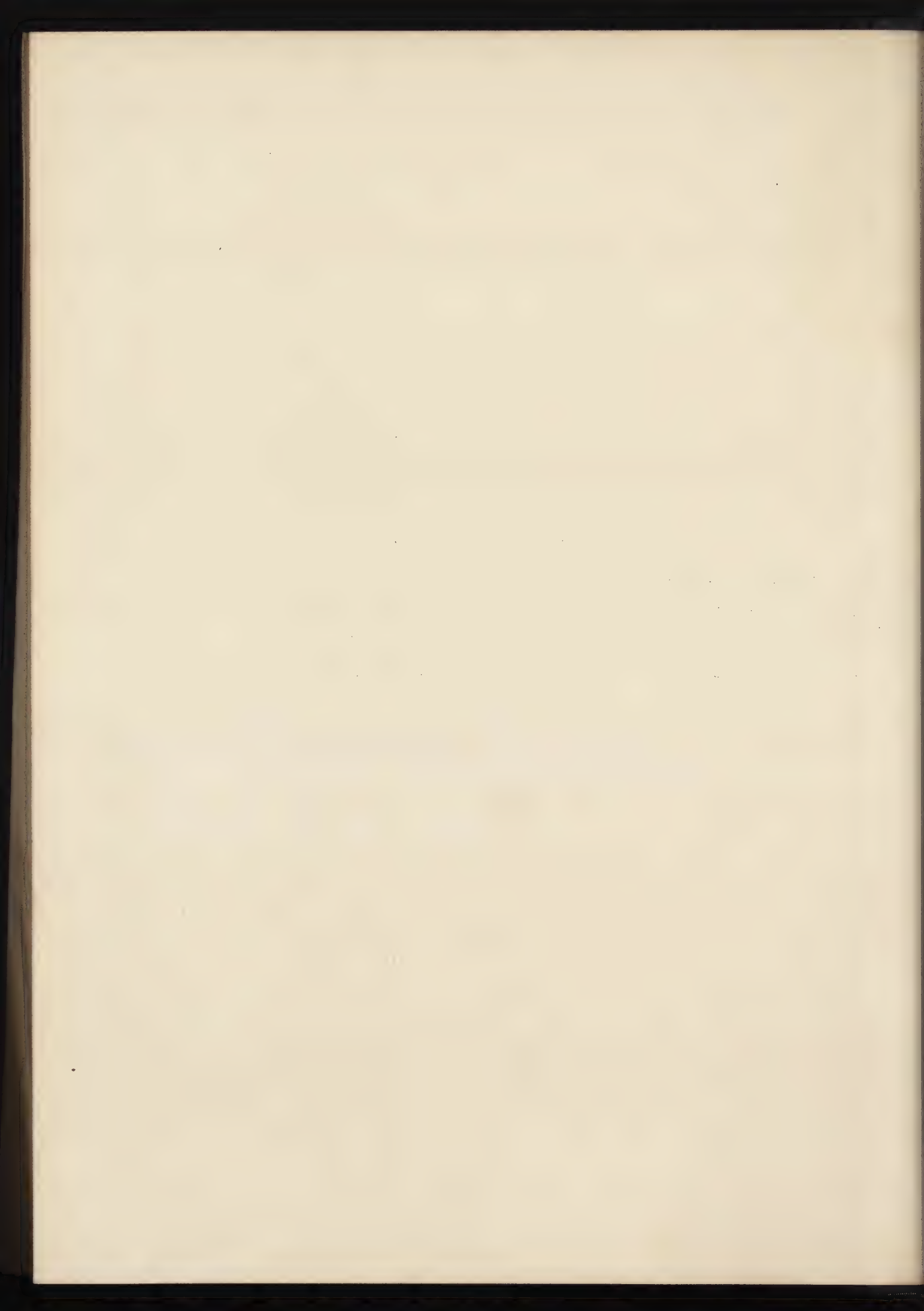
* A full account of the Milan Cathedral competition, from the pen of Mr. Roger T. Conder, *Associate*, is printed in JOURNAL OF PROCEEDINGS, Vol. V., pp. 75-78.

familiarise themselves with the intentions and mode of work adopted by their predecessors, students would do well to devote themselves to the most careful study of their own work. The PRESIDENT urged them to think no time lost which was devoted to its refinement and improvement. He believed that was what was wanted, rather than so much strength being diverted to antiquarian researches. He supposed the most perfect buildings the world had ever seen were the Greek temples and the Propylæa. It was well that they should be familiar with the details and proportions of those works; but it was even more important to remember that that astonishing result of human effort was the work of many generations, many centuries, in which the builders had given themselves over heart and soul to the work in hand; and, so far as was known, when their style had once taken its distinctive features, they had not troubled themselves much about what had been done in other ages and other climes. The same might be said of the mediæval builders; they had concerned themselves with their own work, with the most stupendous results. It did not seem to him of much consequence what the style might be which was selected as a starting-point. When he was young it was hoped that "Gothic" of about the year 1200 would have met with general approbation. Of late years a free treatment of Renaissance had found more favour. That style would, no doubt, answer well if architects held firmly to it while it grew under fostering care. The gardener who was constantly throwing away his transplanted trees in order to put fresh ones of a different kind in their place was not likely to see much good result of his labours. And if they now were ever to see a living architecture growing up in their midst, they must be of one mind as to their style, and they must determine, each of them, to furnish their quota to the development of their art, not by aiming at startling effects, but by giving to their work, their best, most refined, most earnest thought.

9, Conduit Street, Hanover Square, London, W.

* *

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LIV.

NOTES ON BUILDING CONTROL AND ADMINISTRATION,
AND ON THE MAINTENANCE OF PUBLIC BUILDINGS, IN
FRANCE. By FRANCIS HOOPER, *Associate (Pugin Student, 1882).**

Mr. Thomas Worthington, *Vice-President*, in the Chair.

MR. VICE-PRESIDENT AND GENTLEMEN,—

THE English visitor to Paris cannot but be impressed with the systematic arrangement of its main thoroughfares—the regularity of its building frontages and the admirable sites secured for many of its public monuments. The rapidity also with which land, bordering on streets newly formed in central districts, is covered with solidly constructed and dignified buildings indicates the confidence of purchasers that their property will not suffer from any action on the part of their neighbours or of the municipal authorities.

The task I attempted, during my stay in France, was to collect information as to the nature of the control of building operations both in Paris and the provinces; the agencies for its administration in public as well as in private undertakings; and, lastly, the powers obtainable by municipal authorities for effecting local improvements.

I cannot, however, proceed with my report without expressing my grateful recognition of the value of the Bursary, to which I owe the special opportunities I have enjoyed for the study of the subject. Nor can I omit to record the invaluable assistance afforded me by M. Alphand, *Directeur-des-Travaux-de-Paris*; M. Jules Conte, *Directeur-des-Bâtiments-Civils*; M. Hochereau, *Conservateur-du-Plan-de-Paris*; M. Ralph Brown, *Chef-du-Bureau-des-Beaux-Arts (Préfecture-de-la-Seine)*; M. Bunel, *Architecte-Contrôleur-du-Préfecture-de-Police*; M. Collet-Corbinière, *Avocat-à-la-Cour-d'Appel*; and some of the Honorary Corresponding Members of this Institute, more par-

* Mr. Hooper's Paper was written after a prolonged visit to France, made by him as Holder of the Godwin Bursary for 1888. His inquiries were aided by a letter of introduction to the British Ambassador in Paris, given to him by the Secretary of State for Foreign Affairs on the application of the Council of the Institute.

ticularly M. Charles Lucas, of whose courtesy I shall always retain most pleasing recollections.

In considering the subject of Building in France, it is important to bear in mind that the sites are almost invariably the property of the building owner, and that the tenure of land for a term of years by lease is practically unknown. Building operations in Paris are consequently not restricted by any such covenants as are introduced into modern London leases, giving power to the lessor to forbid the execution of work which may be injurious to neighbours; and it follows that the rights and responsibilities of building owners need very careful definition. On the other hand, no owner of property can, as in England on a large building estate, effect local improvements for the benefit of the estate, so that powers must be obtained for united action on the part of the community when any such work is to be undertaken.

In view of the tendency of English legislation to facilitate the sale and purchase of land and the multiplication of freehold interests, details of the French building laws will, I venture to think, prove of much interest to British architects. The Civil Code of 1804 imposes, for the protection of building owners, certain "servitudes," or restrictions, on all land with regard to the erection of buildings, thereby defining the relation of the joint-owners of party-walls, in respect of their construction, maintenance, and alteration, and the distances to be observed between party-walls and constructions which might cause annoyance to the neighbour, such as wells, cesspools, stables, baking-ovens, &c.

"Servitudes" are also imposed with regard to the formation of window-openings affording views over adjoining property. These are of great importance, for in France no prescriptive right can secure to a building light derived over neighbouring private property, as is the case in England, where, after uninterrupted enjoyment during a period of twenty years, rights, acquired without cost to their owners, constantly hamper the erection of buildings in the vicinity, even when separated by the whole width of a public thoroughfare.

To this end, the Code provides that neither window-openings nor balconies may be formed parallel to the boundary line of property at a less distance than 6 ft. 2 in., measured from the external face of such wall or balcony. Nor may an opening in a wall, square or oblique with the boundary, be less than 1 ft. 11 in. distant.

No openings or windows may be made in a party-wall by one owner without the consent of the other, but the owner of a wall abutting on the boundary line is permitted to make openings for light on sufferance, provided such openings are fitted with stout iron bars and furnished with sashes glazed with obscure glass. These openings must not, however, be less than 8 ft. 6 in. from the floor of the ground storey, or less than 5 ft. 4 in. from the floor of each upper storey—their size and shape being otherwise unrestricted.

In the event of a prescriptive right being secured by an enjoyment for thirty years of such openings, it is incumbent on the adjoining owner when building to observe the distance of 5 ft. 4 in. between his building and the face of the wall in

which the opening occurs ; but the height of his wall is not restricted, beyond conformity to local by-laws.

Under exceptional circumstances openings are permitted at less than the legal distance, as when the neighbour suffers no inconvenience, for example : skylights formed in the roof, or windows and terraces shut in by a solid wall ; but tolerance continues as long only as the conditions do not alter.

The public way being common property, no restrictions are imposed as to views obtained from windows or balconies overlooking it.

The *Loi d'Alignement* gives powers to municipal authorities to create a servitude on land bordering on public thoroughfares, which is in advance of the line of frontage laid down on authorised plans of alignment ; this servitude, preventing the erection of any new building, or the reconstruction or structural repair of any portion of any old building existing upon it, in process of time secures the rectification of the lines of frontage in old streets as well as their widening.

This law had its origin in the reign of Henri IV., in 1607, when it was enacted that application should be made to the *Grand Voyer*, or Surveyor to the King, for permission to build along any part of the *grande voirie*, or highway, thus securing to him power to amend the lines of frontage ; and about a century and a half later, the need for systematic procedure becoming apparent, instructions were issued that every town of upwards of 4,000 inhabitants should cause the preparation of plans of its streets, together with recommendations as to the future lines of frontage to be adopted.

Such plans were to consist of a general map of the town, to a scale of $\frac{1}{2000}$; and another showing all buildings abutting on the streets, to a scale of $\frac{1}{500}$,—a vast undertaking, which has, I believe, been generally accomplished in the provinces. On these plans the line of frontage of each property bordering on the streets is shown with its side boundaries, and in the case of public buildings the external walls are drawn in detail, as also their approaches and main entrances.

A few general instructions were issued for the guidance of the engineers, surveyors, and others engaged in studying the adjustment of the frontage lines, amongst which I find that widening, if not equally on the two sides, is to take place on the side of the less valuable property ; that a series of straight lines is to be followed, to avoid curved frontages, which are difficult to set out ; and that the situation and aspect of public buildings, as well as all substantial property, are to be respected.

The procedure in regard to the public exhibition of the plans, and the enquiry instituted by the Prefect of the Département, before the new alignment becomes effective by the declaration of their public utility by the Chief of the State, are similar to those of expropriation, and are described later, as also the mode of awarding compensation.

The structural repairs which are prohibited by the servitude of alignment are such as would consolidate the building and prolong its duration indefinitely. On the other hand, the Courts have allowed the repair of roofs and cornices, façades to be raised, and the position of windows altered. The equity of this "servitude" is based on the principle that the thoroughfares are public property ; buildings erected along

them enjoy light, air, and convenience from their proximity, and their owners are therefore held to respect the enjoyment and convenience of the public.

When, from whatever cause, the owner of property to be set back desires to rebuild, the new alignment is followed unhesitatingly; and should he not be satisfied with the offer of compensation made to him by the municipal authorities, he can apply to the Prefect of the Département for a consideration of his claims by the Jury of Expropriation at their next sitting, and its award is binding on both parties, unless notice of appeal before the Cour-de-Cassation is made within fifteen days. In estimating compensation no consideration is given to buildings on the ground to be vacated, as the owner may enjoy their use until, from decay or other causes, his property becomes subject to condemnation as injurious to the public, and reconstruction necessary at his expense. In the valuation of the land much depends on the free space in the rear of the house; for, if garden land only, the setting-back is not costly; but should sufficient ground not exist for rebuilding a healthy house, the whole site is purchased, and offered at a price to the adjoining owner. The adjoining owner may appeal for a valuation by a jury, if willing to purchase; but if unwilling, it is possible for the authorities to acquire his property by the agency of the Law of Expropriation on account of Public Utility, and to dispose of the two sites as they deem best.

This Act, not being costly in execution to the community, is applied in many of the provincial towns with manifest advantage, where its exceedingly slow operation is not of great inconvenience. It is also in operation in many of the older streets of Paris, although a general plan of alignment of the city has never been executed, the task having proved too formidable.

In Paris, however, the necessity for more rapid execution of improvements, to meet the demands of a busy and wealthy city, had led to the application of powers granted by the *Loi d'Expropriation pour cause de l'Utilité Publique* of May 3, 1841, and which provides for the immediate acquisition of property, by municipal or other bodies, required for varying purposes, such as sites for new public buildings, monuments, streets, railways, &c., as well as of property required for the sanitary improvement of a district. In order to secure the rights of the individual, three operations of great importance are necessary to effect expropriation:—

1. "The Declaration of Public Utility," by the State.
2. "The Judgment of Expropriation," by a Court of Justice.
3. "The Award of Compensation," by a Jury.

Plans having been prepared, in accordance with certain general instructions, to fully demonstrate the scheme and the relation of the proposed works to existing streets and public buildings, an *enquête préliminaire*, or enquiry, is held at the Mairie of the arrondissement in which the property to be acquired is situate. This *enquête* is announced by placards posted throughout the arrondissement, as well as by advertisements in the local newspapers, and for fifteen days the plan is exhibited, in order that the residents, and others interested, may examine it and record their observations

in writing. For three additional days a *Commissaire-enquêteur*, or agent appointed by the Prefect, attends at the Mairie to record all verbal observations made to him with regard to the scheme. These observations may relate either to the questionable necessity for the work, or to the efficiency of the plan proposed. The *Commissaire enquêteur* also furnishes a full report, giving his own opinion on the scheme, which is forwarded, together with all other documents, to the Town Council; and, should it be determined to modify the scheme in accordance with suggestions offered, a revised plan is exhibited. The plan and reports are then submitted by the Prefect of the Département, with his observations, to the Ministry of the Interior, where the project is examined in the Office of the Voirie, which controls the whole of the thoroughfares of France; if approved, the documents are submitted to the Conseil-d'État, and the scheme becomes effective by the signature of the Chief of the State to a declaration of its "public utility." The succeeding stage of the procedure is the "judgment of "expropriation," which can only be pronounced by the High Court of Justice, after being assured that provision is made for adequate compensation to all whose property and rights are to be acquired on the ground of "public utility." A second enquiry is held, which is publicly announced like the first, and extends over eight days, during which time a *plan parcellaire* is exhibited. This plan, with certain additions, is the same as the former, all the properties to be acquired being numbered consecutively; a list is attached giving the names of the several owners, copied from the *matrice cadastrale*, or official register of property, together with the tenants reported by the *Commissaires-voyers* as having claims to compensation. A general description is given of each property, with its area and the character of building upon it. This enquiry permits the notification of any interests which may have been overlooked, and the correction of any errors in the description of property. The High Court thereupon pronounces "expropriation"; and, in the case of municipal improvements, a decree of cessibility by the Prefect renders the occupants of the property "tenants "at will" of the municipality. The judgment of the Court is made public by advertisement, and claimants for compensation must at once communicate with the municipal authorities or other body for whom the expropriation is effected. Should the offers of the promoters not be accepted within eight days, application is made to the Court for the appointment of a jury to settle the claims for compensation.

The Jury of Expropriation, constituted similarly to that in criminal cases, consists of twelve persons, whose qualifications are that they have reached thirty years of age and are entitled to vote in parliamentary elections. The Court transmits to the promoters through the Prefect of the Département a list of sixteen jurymen and four supernumeraries, whose names are in turn communicated to the claimants. Both the promoters and the claimants respectively have the right of cancelling two names in the list, and the jury will consist of the first twelve persons remaining. A *magistrat-directeur* (being a Judge of the Civil Tribunal) conducts the deliberations; documents are laid before the jury, and witnesses are examined. The properties are inspected, the decision being by the votes of the majority, and costs are taxed by the *magistrat-*

directeur. The awards, which are in the form of a report justifying the valuation, are binding on both parties, unless notice of appeal to the High Court be given within fifteen days; the jury not being dismissed until all claims are settled in connection with any one scheme. I am indebted to M. Collet Corbinière, *avocat* at the Cour-d'Appel of Paris, and author of the legal notes in the *Semaine des Constructeurs*, for specimens of the documents submitted to the Jury of Expropriation by persons having claims for compensation. It was also with this gentleman that I attended the sitting of the jury considering the claims in regard to the extension of the Rue-Monge, of which I have the plans.

An Act of 13th April 1850 provides that in every Commune where deemed necessary, the Town Council may nominate a commission to investigate and determine measures requisite for the sanitation of dwellings the condition of which is injurious to the life and health of the occupants. The commission originally consisted of not more than nine, nor less than five, persons; but the number has since been raised, and amongst them must be a medical man and an architect or other scientist (*homme d'art*) selected from outside the Commune. The mayor or his deputy presides, and the commission is renewed every two years by one-third of its number, but retiring members are eligible for re-appointment. Its members visit places notified as unhealthy, acquaint themselves with their condition, ascertain the causes, consider means of remedy, and schedule such dwellings as are, in their opinion, incapable of efficient sanitation.

The reports of the commission are deposited at the Mairie, and the parties interested are summoned to make their observations within an interval of a month, at the expiration of which the reports and observations are submitted to the Town Council, who determine—(1) the necessary works to be executed, and the time allowed for their completion; and (2) the dwellings incapable of sanitation.

Appeal may be made to the Council of the Prefecture of the Département within a month of the date of the resolution of the Town Council; and should it be recognised that the causes of insalubrity are dependent on the action of the proprietor or lessor (*usufruitier*), the municipal authority may compel him, by police order, to execute the works considered necessary. Should the works remain unexecuted, the dwellings continuing in the occupation of a third party, the proprietor or lessor is subject to a fine, to be handed to the relieving-officer in the district (*bureau-de-bienfaisance*) in which the dwellings are situated.

When unhealthiness results from external and permanent causes, or when these are only remediable by comprehensive works, the Commune is able to acquire the whole of the property comprised within the compass of the operations, in accordance with the forms and after the fulfilment of the formalities prescribed by the Law of Expropriation of 3rd May 1841. After the sanitary measures have been effected, surplus land is sold at public auction, unless the former proprietors claim the application of articles 60 and 61 of the Act before mentioned, by which they are entitled to the first refusal to purchase the land at a price determined either by private treaty or, in case

of disagreement, by a jury. Public notice, published in due form, is given of the sale of such land as the authorities are in a position to resell. Within three months of the date of this publication, former proprietors wishing to reacquire property are held to make a declaration to that effect; and within a month of the settlement of the price, whether by treaty or award of the jury, must contract to repurchase and pay the price, failing which they are subject to a loss of the privilege thus granted to them. By these powers the Quartier-Marbœuf and the Rue-des-Filles-Dieu in Paris were reconstructed.

By the Act of 25th May 1864, the number of commissioners in towns exceeding 50,000 inhabitants was increased to twenty. In Paris there are thirty members, each of whom has his allotted district, which in some cases comprises the whole of an arrondissement, in others not more than one-half. A fee of £1 is presented to a member at each weekly meeting, in the form of a *jeton de présence*, and the appointments are sought by doctors and other professional men on account of the status they afford.

PRIVATE BUILDINGS IN PARIS.

Plan of Paris.—The official plan of the Paris streets is a most important feature of the French system. It is in charge of a large staff, responsible to the Directeur-des-Travaux-de-Paris, who, though independent of the three main divisions of the Department of Works, and responsible only to the Director of Works, is closely associated with all the operations of the Division of Public Thoroughfares. Their work is to preserve a correct plan of the city, showing the authorised alignment of every street, for the purpose of determining the lines of frontage to be followed in the case of all new buildings or reconstructions bordering on the public streets; to prepare plans of all property bought or sold by the municipality; to elaborate schemes for new streets, and the improvement of those existing.

To the chief of this service, M. Hochereau, an architect, I am indebted for most kind assistance in collecting plans and details of procedure. The forethought in matters of street improvement is well exemplified by a work published in 1878 by the Prefecture of the Seine, entitled *Projets de Voirie*, which is a register of the various schemes drawn up at that time. These are classified by Arrondissement—as street widenings, new thoroughfares, &c. A description of each is given, with details of its length, the ground to be thrown into the roadway, the estimated cost of acquiring the necessary property—cost of construction and selling value of surplus land, resulting in the approximate estimate of the cost of execution. With such a register a municipal councillor or ratepayer can, without difficulty to himself or labour to the authorities, ascertain what improvements are contemplated or have been contemplated in his own locality.

Laying out of Streets.—M. Alphand, in a report to the Municipal Council of Paris, recommending a large expenditure on street improvements in anticipation of the

International Exhibition held in 1878, defined the principles upon which municipal improvements should be planned, viz.—

- (1) To open up the most crowded districts and admit more light and air.
- (2) To create large arteries connecting the most important centres of business and habitation.
- (3) To facilitate approach to the several railway termini.
- (4) To avoid old lines of streets, on account of difficulties in adjusting the levels.
- (5) To adopt straight lines for strategic purposes.
- (6) To effect uniform gradients for easy transit.

The whole of the streets of Paris have, for purposes of simplification, been classed as belonging to the *grande voirie*, and all building operations in Paris are, therefore, subject to the control of the Prefect of the Département of the Seine, who exercises all the functions of Mayor of Paris, with the exception of the control of the police, who are under the command of the Prefect of Police. The latter, like the Prefect of the Seine, is appointed by the Government, and, in his capacity of guardian of the safety of the streets and places of public assembly, administers the building regulations in regard thereto. The following are among the chief provisions of the By-laws, dated July 23, 1884, under which building operations are carried out in Paris:—

Permission to build.—No new building, reconstruction, or addition may be commenced in any of the streets of the city, without the permission of the Prefect of the Seine; and in order to obtain this, application must be addressed in writing to the Prefect at the Hôtel-de-Ville on *papier timbré*—that is, paper bearing the Government duty stamp of fifty centimes—and accompanied by drawings, which must comprise plans of each storey, together with a cross-section showing the height and general construction, to a scale of two centimetres to a metre, or about one quarter of an inch to the foot.

Line of Frontage.—The first consideration in all proposals for new buildings or reconstruction is the line of frontage to be followed, which is ascertained by reference to the official plan of the city, before described, and which is in charge of a special department at the Hôtel-de-Ville.

Height of Buildings.—The maximum height to which buildings may be carried is dependent on the distance between the authorised lines of street frontage, which, until alignment has been effected, does not always correspond with the actual width of the street. The height is measured from the highest part of the footway along the façade, and includes the entablature, attic storey, and every construction flush with the wall. The front wall adjoining the street may not exceed in height 39 ft. 3 in. in a street 25 ft. 6 in. in width, or less; 49 ft. 1 in. in a street from 25 ft. 6 in. to 31 ft. 10 in. in width; 58 ft. 11 in. in a street from 31 ft. 10 in. to 65 ft. 6 in. in width; 65 ft. 6 in. on squares, quays, boulevards, or streets of 65 ft. 6 in. in width and upwards. Where streets have an incline, façades of more than 98 ft. 2 in. frontage must be lowered according to the fall of the ground; but in the erection of several distinct houses the height of each is measured separately.

Buildings constructed partly on the line of street frontage and partly behind, whether set back or otherwise, must be confined within the same perimetre as if on the line of street; but a building at the corner of streets of unequal width may return at its full height along the narrower street for a distance not exceeding three times its width. Façades set back from the line of building frontage may be raised respectively to the heights of 49 ft. 1 in., 58 ft. 11 in., or 65 ft. 6 in., provided the setting back added to the width of the thoroughfare gives in the first instance not less than 25 ft. 6 in., in the second 31 ft. 10 in., and in the third 65 ft. 6 in.; but no private buildings adjoining any street or other public thoroughfare may exceed the height of 65 ft. 6 in.

The heights of buildings bordering on private roads, passages, courts, &c., are regulated in the same manner as those bordering on public roads.

Number and Height of Storeys.—No building may exceed seven storeys in height, including the usual mezzanine, between the ground and first floors, and the attics in the roof. The height of the ground floor, measured to the ceiling, may not be less than 9 ft. 2 in., and the height of the basement and other storeys not less than 8 ft. 6 in.; the storeys in the roof being measured to their highest part.

Roofs above the Façades.—In buildings bordering the public way, the outline of the roofs of the front, as well as wing buildings, must be contained within the arc of a circle the radius of which is equal to one half the legal or actual width of the public way, so long as the radius does not exceed 27 ft. 6 in.; but should the width of the street be less than 32 ft. 8 in., the builder is entitled to a radius of 16 ft. 4 in. Whatever may be the form or height of the roof, all projections must be kept within the defined arc of the circle; the starting point of the arc being on the vertical plane of frontage, the centre level with the legal height of the façade. These regulations, except as regards the arc of the roof, apply equally to buildings set back from the public way and to private thoroughfares, passages, and courtyards, always excepting the enclosing walls of a staircase constructed in a courtyard, which may rise as high as the ceiling of the highest floor approached by such staircase.

Chimney-stacks.—No chimney-stacks may be constructed at less than 4 ft. 9 in. back from the exterior face of the front wall at its base, nor rise more than 1 ft. 11 in. above the highest point of the roof. The outside face of dormer and bull's-eye windows may be flush with the wall-face, but may not project; and the cresting of such windows must not extend more than 1 ft. 7 in. beyond the legal perimetre of the roof. The collective widths of the dormers may not exceed two-thirds of the entire length of a building. The foregoing regulations apply equally to buildings on and off the lines of street frontage.

Courtyards and Areas.—In buildings whose height does not exceed 58 ft. 11 in., the courtyards, giving light and air to habitable rooms, may have an area of 300 ft. super., with a mean width of not less than 16 ft. 4 in.; but where the height exceeds 58 ft. 11 in., the courtyard is required to have a minimum surface of 400 ft., with a mean width of not less than 16 ft. 4 in.; and when the wings of these buildings likewise exceed 58 ft. 11 in. in height, the court must not be less than 600 ft. super., with

a mean width of 19 ft. 7 in. at the least. The courtyard of 400 ft. superficial area is, however, not required in buildings having frontages on several streets, and on sites of such dimensions as would render it impossible to erect buildings occupying the whole space between the thoroughfares.

Shafts by which light and air are admitted to kitchens must not have less than 90 ft. superficial area, or a mean width of less than 5 ft. 10 in.; and those used exclusively for lighting and ventilating water-closets, vestibules, or corridors must have at least 40 ft. superficial area, and a minimum width of 5 ft. 3 in. Windows of habitable rooms may be made in such shafts, on the top storeys, provided the shaft has a minimum superficies of 50 ft.

It is illegal to fix a glass roof to a court or area above rooms which are lighted and ventilated by it, whether living-rooms, kitchens, or closets, unless furnished with vertical ventilating sashes, having open spaces equal to at least one-third the area of the court or area, and 1 ft. 3 in. in height, with an inlet formed below, to take air from the cellars or basement, at least 2 ft. 7 in. square.

When several proprietors covenant with the city authorities to maintain in perpetuity courtyards in common, such courtyards being together one and a half times the authorised area, the proprietors may raise their buildings to the heights corresponding to the authorised area; but in case of the union of several courts, the height of the division walls must not exceed 16 ft. 4 in. Air-shafts, however, may not be united or shared by several proprietors in common.

Projections.—The projection of cornices, string-courses, balconies, &c., along the streets is regulated by By-laws revised in 1882.

The face of the side walls of every building following the line of frontage is required to accord with the alignment, and may not in the height of the ground storey receive any projection forming part of the structure of the building.

All projections are measured from the authorised line of street-frontage, and it is only necessary to set back the front of the building in order to secure all the relief that can be desired for convenience and architectural effect. The monotonous flatness of Paris façades is, therefore, not wholly due to building restrictions.

Periodical Cleansing of Façades.—A statute of 26th March 1852 provides that house-fronts shall be cleaned down once at least in every ten years, by scraping, painting, or washing; and, to secure a certain uniformity of action, it is the custom of the authorities to schedule yearly two of the twenty arrondissements of Paris for this purpose.

CENTRAL ADMINISTRATIVE SERVICE (PARIS).

The "Department of Works" of the Prefecture of the Seine is presided over by M. Alphand,* a distinguished engineer, known to British architects by the important

* See *Les Promenades de Paris - Bois de Boulogne - Bois de Vincennes - parcs, squares, boulevards.* 2 vols. fo. Paris, 1870-74.

work on Paris published under his supervision. This Department comprises three main Divisions, each of which has its responsible chief:—

1. The Water, Canal, and Drainage Services.
2. The Public Thoroughfares.
3. Buildings and Property belonging to the Municipality.

All applications for permission to build are dealt with by the second Division, having charge of the public thoroughfares, which defines and verifies all lines of building frontage and levels, maintains the roads and footways, trees, street-lighting, &c., negotiates for the sale and purchase of property, and superintends the execution of street improvements. The active staff of the Division has duties very similar to those of the District Surveyor in London, and consists of officers known as *Commissaires-voyers*, appointed by the Municipal Council after evidence of technical training and competence, either by diplomas, or by reference to executed works. The appointment is permanent, and remuneration is by a salary, increasing according to length of service, ranging from £240 to £320. These officers, twenty in number, are each charged with the supervision of building operations in one of the twenty arrondissements of Paris. Each has an office at the Mairie of his arrondissement, and is assisted by an *adjoint*, or deputy. The *Commissaire-voyer* is required to reside within the arrondissement to which he is appointed. He is free only to practise as architect or expert beyond its limits, and he may not act as expert in matters in which the Municipality has an interest. He is regarded, in cases of building infringement, as *voyer* of the whole of Paris, and is consequently held to report every instance which he observes. The fines imposed on the erring proprietor are handed to the *voyer* who first gave notice of an infringement. Besides reporting on every application for permission to build, and examining plans submitted, it is the duty of the *Commissaire-voyer* to estimate the fees (*droits*) due in regard to the window and door openings, the projection of cornices, balconies, &c., over the public way, according to the fixed *tarif* of the city, which sums are required to be paid to the Receiver of the Prefecture of the Seine before sanction for the work is granted. Reports are made every three months of the various building operations in progress, and of works authorised but not commenced, as permissions are invalid at the expiration of twelve months. Cases of importance and difficulty can be submitted to the *Commission supérieure de la Voirie*, of which the Director of Works is President, the Sub-Director Vice-President, its members being the Chief of the Bureau-des-Alignements, the Chief Engineer of Streets and Promenades, the Chief of the Division of the Public Thoroughfares, three *Commissaires-voyers* as permanent members, and two appointed for one year only.

The *Commissaire-voyer adjoint* is usually a successful student of the École-des-Ponts-et-Chaussées, or of the Architectural Section of the École-des-Beaux-Arts, and has passed the qualifying examination for the post. The examining board consists of three of the engineers of the service and two *Commissaires-voyers*. The subjects dealt with include drawing, geometry, physics, building construction, administrative law, and building regulations. The qualified candidates must not be less than twenty-five

or more than thirty-five years of age ; and, being placed by the examiners in order of merit, they are appointed by rotation to vacancies as they occur. Examinations are held only when the list of qualified candidates is exhausted.

THE PREFECTURE OF POLICE (PARIS).

General Building Regulations.—The police regulations are chiefly such as provide for the safety and convenience of street traffic. No barrier, hoarding, scaffold, shoring, or ladder may be erected in the streets or thoroughfares without permission, applications for which must be addressed to the Prefecture, on *papier timbré*, defining the nature of the requirements. No fees are due in respect of these applications. The temporary erections for fêtes, fairs, processions, &c., are all under police control ; and all theatres, places of public assembly, factories of dangerous trades, prisons, &c., are subject to the periodical inspection of the police architects, and their construction must be in conformity with by-laws regulating the entrances and exits, mode of lighting, fire-hydrants, &c. The Architecte-Contrôleur of the Prefecture of Police undertakes personally the inspection of prison buildings. The staff consists of ten architects, each of whom is responsible for the fulfilment of the police regulations, in matters of building works, within a district comprising two of the twenty arrondissements. Their duties consist in reporting on all applications for permission to erect barriers, scaffolding, &c., with recommendations for best securing the safety and convenience of traffic. They have to make periodical inspections and to report on the condition of the theatres, factories, &c., which are allotted to them irrespective of the limits of their several districts. At a weekly meeting of the police-architects reports and recommendations are submitted for the signature of the Architecte-Contrôleur, who presides. Matters of difficulty are brought before this meeting, and action is taken after united counsel. Vacancies in the staff of architects to the Prefecture of Police are filled in rotation by candidates who have passed a qualifying examination conducted by the sitting architects. This examination, involving a knowledge of building construction, jurisprudence, and special practice, is held only as occasion requires. Remuneration is by salary increasing every three years until a fixed limit is reached. These architects may carry on private practice, but when undertaking work within their own district they are required to give notice thereof. The salary of the Architecte-Contrôleur amounts to 5,000 frs. (£200) ; the fees of other architects range from 1,500 frs. to 3,000 frs. (£120), with an allowance of 500 frs. (£20) for carriage fares.

PUBLIC BUILDINGS.

Public Buildings throughout France may be divided under the following heads :—
1. *Bâtiments communaux*. 2. *Bâtiments départementaux*. 3. *Bâtiments civils du service public et palais nationaux*.

Bâtiments communaux.—The buildings belonging to the Commune, or township, usually comprise the Town-hall, churches, museums, libraries, day-schools, markets,

slaughter-houses, &c., which are maintained at the expense of the Commune, and are in charge of an architect, appointed by the Town Council, with the title of *Architecte de la Ville*. His duties consist in the preparation of reports, estimates, specifications, and drawings for all necessary works of maintenance, repair, and minor alteration sanctioned by the Town Council, which are executed under his superintendence. The settlement of accounts is undertaken by a surveyor (*vérificateur*) employed by the Council, who measures the work as it proceeds, pricing it in accordance with the Town Schedule upon which the contractor has based his tender—this being a percentage above or below, according to circumstances. The appointment of *Architecte de la Ville* is sometimes the result of open competition; the salary is usually fixed (exclusive of office expenses), and he receives a fee of about one per cent. on the value of all executed work. At Havre the architect receives a salary of about £480, and is not permitted to carry on a private practice. At Caen, a town in which the duties of the architect are much less onerous, the architect receives about £240, exclusive of office expenses, but is permitted private practice. In Paris there are ten City Architects, each having charge of the buildings comprised within two of the *arrondissements* of the city. Each architect has under his direction two assistants (*inspecteurs*),* one sub-inspector, and a measuring surveyor. The salary is about £260, with an allowance of about £80 for office expenses, and private practice is permitted. The maintenance of the Hôtel-de-Ville and its dependencies, in which are installed all branches of the central administration, is entrusted to an architect specially appointed, and is not included amongst the buildings of the *arrondissements*, each of which has its *Mairie*. After a service of thirty years these official architects of Paris are entitled to retire on half pay, and similarly on reaching the age of sixty.

Bâtiments départementaux.—The buildings belonging to the Département comprise the offices of the Prefecture (which correspond to the offices of our county administration), the Courts of Justice, asylums, hospitals, reformatories, &c. An architect is appointed by the Prefect in each Département to take charge of these buildings. In the Département of the Seine, which includes the whole of Paris, these buildings are divided into two groups, each of which is in charge of an architect, who has an assistant (*inspecteur*),* a sub-inspector, and a measuring surveyor; and he is responsible to the Director of Works of the Prefecture of the Seine.

Bâtiments civils et palais nationaux.—The maintenance and repair of the buildings of the public service and the national palaces of France, other than military buildings, prisons, diocesan buildings, and historical monuments, are undertaken by a special department, the organisation of which has been but little changed since 1848.† It consists of four main sections, viz.:—1. Buildings in Civil Use. 2. National Palaces. 3. Furnishing and Guardianship. 4. Finance. Each of these sections has its chief. The two first sections comprise the examination of specifications and estimates for all

* These, as a rule, are young architects. † See Gourlier's *Notice Historique sur le service des travaux des bâtiments civils à Paris et dans les départements depuis la création de ce service en l'an IV. (1795)*. 8vo. Paris, 1848. The history of this service was continued by the late M. Questel.

works of repair, alteration, decoration, &c., recommended by the several architects in charge of buildings and monuments. The third section deals with the furnishing and guardianship of the palaces, picture-galleries, &c., as well as the arrangements for public fêtes and official ceremonies; and the fourth section controls the disbursement of the finances of the whole Service.

Every building or monument under the charge of this department has its appointed architect, with a staff of assistants, whose duty it is to inspect the building from time to time, and to report to the Directeur-des-Travaux on such work as is required to maintain the whole in good repair. Specifications, estimates, and plans, when necessary, are prepared to accompany the reports; and the works, when authorised by the Director, are carried out under the superintendence of the architect attached, as above described, to the building. These appointments are generally filled by architects who have been students of the Academy of France in Rome, or by those who hold the Government diploma in architecture; and they are sought rather on account of the professional status afforded than for their monetary value.

The buildings and monuments in charge of this department number in all about one hundred, and though in some few cases one architect is entrusted with more than one building, it is the exception rather than the rule.

The Director is assisted and advised by four architects, who have the title of Inspectors-General, each of whom exercises a general supervision over one fourth of the buildings, of which by far the greater number are situated in Paris. These Inspectors-General are selected from amongst the most distinguished French architects of the day, and are very generally members of the Academy of Fine Arts (Institut-de-France); their fees amount respectively to about £240 a year. A staff of inspectors, who, as a rule, are architects, assist in the superintendence of works, and present reports to the Inspectors-General on the progress of the works in their respective districts.

At the commencement of each financial year, the reports of the architects on buildings under their care are examined by the Inspectors-General, and the sum voted by Parliament is apportioned amongst the several establishments on their recommendation. The architects receive fees proportionate to the verified or revised estimates, amounting to four per cent. for works of maintenance, and three per cent. for new works or for structural repair. Under the orders of each architect is a staff nominated by the Minister: consisting of an inspector, one or more sub-inspectors, and a clerk of works (*conducteur*), each of whom has a fixed salary. The *vérificateurs* (measuring surveyors) receive one per cent. on the amount of the accounts they adjust and verify. In extensive works, the procedure is little different as regards the finance, *vérification des mémoires*, &c.; a programme of requirements is obtained from the department which is to occupy the enlarged or altered buildings, and an Act of Parliament is always required when new works are to be undertaken.

In the case of newly erected buildings, the architects who have constructed them are as often as possible entrusted with their maintenance: this course not only

secures to the Government the advice of the architect best acquainted with the building, but enables the architect to explain his original intentions when any question of furnishing or decoration is raised.

DIOCESAN BUILDINGS.

The diocesan buildings comprise the cathedrals and metropolitan churches, the residences of the archbishops and bishops, and the clergy schools. The maintenance or repair of these buildings is dependent on the sum voted annually (for the purpose) by Parliament, and included in the Budget of the Minister of Public Worship. The funds are apportioned amongst the several dioceses by the Minister.

There are in France at the present time eighty-five dioceses, to each of which an architect is appointed by the Minister of Public Worship. The appointments are generally filled by architects already known to the Minister as having carried out new works, or having acted as resident-inspector under some other diocesan architect.

The duties of the diocesan architect consist in superintending the works of repair and maintenance of the buildings under his care. He has to prepare plans, reports, and estimates of all necessary works, for submission to the Minister for the grant of funds. He is assisted in his work by an *inspecteur*, who is generally an architect practising in the locality, so that minor questions may be settled promptly on the spot. The record of work is kept by the architect; and, to prevent dispute in the settlement of accounts, the vouchers are signed every three months by the contractors before they are forwarded to the Minister, who hands them to the Department of Works in connection with Public Worship, for verification and payment.

The diocesan architects receive fees amounting to three and a half per cent. on the work executed; their travelling expenses are allowed, and in most cases a resident-inspector is provided them. If resident in Paris, the architects are allowed an additional fixed sum of about £48 a year, as compensation for additional time in travelling and correspondence. A diocesan architect holding more than one appointment does not receive an increased grant. The post is much sought after, on account of the opportunities which it opens up for practice in the diocese; and where an architect is willing to put the less important work into the hands of his inspector, this subsidiary appointment becomes of much value.

THE HISTORICAL MONUMENTS.

In considering this question of the preservation of historical monuments in France by the State, it is necessary to follow the circumstances which have rendered such a course possible. After the Revolution of 1789 the ecclesiastical buildings of the country became national property, each Commune maintaining its parish churches and presbyteries, whilst the diocesan buildings, bishops' palaces, and dependencies were placed under the control, for use and maintenance, of the Ministry of Public Worship (*Ministère des Cultes*). In addition to buildings for religious purposes

there were many ancient monuments of great interest already in charge of public authorities, and for the maintenance of which public money was from time to time expended. Any important outlay on the part of the Commune needed the approval of the Prefect of the Département, and expenditure on behalf of the Département required the sanction of the Minister of the Interior, so that when (about the year 1830) sufficient public interest was aroused to support a movement for the protection of historical monuments from unwise or detrimental works,—and, on the other hand, to permit the Minister of Public Instruction and Fine Arts to obtain a grant of money towards assisting the repair of monuments already perishing by neglect,—it was not difficult to require the Prefects to refuse sanction of expenditure on any monument which appeared of historical interest without having first consulted the Inspector-General appointed to examine all such proposals.

In 1830, in consequence of the ravages of time, neglect, and ill-usage to which many of the historical monuments of France had been subjected, the Government of the day voted a modest sum towards encouraging their preservation. This was continued annually with increasing sums, till, in 1837, a Commission was appointed to assist with advice as to the disposal of the funds amongst the numerous applicants.

In 1832, the Minister of the Interior forwarded a circular letter to the Prefects of Départements, inviting them to inform him as to the condition of the principal churches within their jurisdiction, and at the same time to refuse to sanction any public expenditure on alterations or important repairs without the previous approval of the Inspector-General of Historical Monuments appointed by him.

The buildings and monuments were, later, placed in three different classes by the late Prosper Mérimée, the first Inspector-General and Secretary to the Commission—each of these representing a distinct epoch in history.

1st. *Constructions of unknown origin*, such as menhirs, dolmens, tumuli, &c.

2nd. *Roman and Gallo-Roman Monuments*, comprising temples, amphitheatres, aqueducts, triumphal arches, baths, tombs, statues, and inscriptions.

3rd. *Monuments of the Middle Ages and the Renaissance* (fifth to the seventeenth century), comprising churches, monastic buildings, châteaux, &c.

Since the establishment of the Commission of Historical Monuments buildings of historical and artistic interest, whether national property or in the possession of private owners, have been scheduled, and all works of repair, alteration, or addition are prohibited without the previous approval of the Commission.

Two courses are open for the purpose of cataloguing or scheduling a monument as of historical interest, and thus of claiming participation in the grant made by the Minister of Public Instruction for its preservation. The first is the application made by the owner of a monument, whether a public body or private individual, that the monument may be classed amongst those of historical interest to be preserved by the State. For this purpose it is necessary that drawings should be prepared fully illustrating the monument, accompanied by an historical description and a report of its condition. These documents are examined by the Commission, and if necessary one of

the Inspectors-General makes a personal inspection and separate report. The second course is the entry on the catalogue of a monument as of historical interest, on the recommendation of the Commission, with or without the consent of the owner. This may sometimes occur to prevent the loss to the nation of an important monument, and it is possible for the Minister to apply the *Loi d'Expropriation pour cause de utilité publique*, by which the owner is dispossessed of his property, and compensation awarded him by a jury.

In the case of public buildings scheduled as historical monuments, the expense of maintenance and repair is shared by the State and the Commune, or the Département; whilst the owner of private buildings is assisted by the State, but is allowed to carry out no work without the approval of the Commission, even at his sole expense. If, however, an owner whose property is scheduled has made an application, and three years elapse without any subsidy being granted him, the prescription becomes extinct, and he is free to deal with his property as he thinks fit.

The funds granted for the preservation of historical monuments are distributed amongst the claimants on varying conditions; but the Commission makes a principle of giving precedence to works which will best illustrate certain epochs of national art and distinctive local styles. In the case of churches, which constitute a large proportion of the historical monuments, the general practice (though not a fixed rule) is for the Commission to contribute about one-third of the necessary funds, leaving one-third to be provided by the fabric or ecclesiastical body, and one-third by the Département or the Commune.

During the year 1888 there were thirty-nine architects carrying out works of repair, &c., to historical monuments in various parts of the country. The architect's fees for superintendence of the execution of authorised works amount to five per cent. on the total sums expended, whilst their local inspectors when appointed receive two and a half per cent., and may, like the architect-in-chief, be engaged on more buildings than one. The fees of the architects for the preparation of drawings, reports &c., are based on the length of time occupied and the distance travelled.

BUILDING COUNCILS SITTING IN PARIS.

Conseil d'Architecture de la Ville de Paris.—In order that the Prefect of the Seine may be able to secure independent technical advice on architectural questions, a standing Council, composed of experts, is attached to the Prefecture, and summoned as occasion requires. M. Alphand is President of the Council, M. Bailly Vice-President, with other members, including M. Garnier, two architects of arrondissements, one architect of the Département, and four honorary architects on the retired list of City Architects. The members of the Council receive a nominal fee (*jetons de présence*) on attendance at the meetings.

Conseil général des Bâtiments civils.—The Council for Buildings can show a record of great usefulness since its foundation by Colbert. The members meet twice a week,

and advise the State on architectural questions. Their duties consist in the examination of plans for proposed buildings; the study of sites, plans for proposed street-alignments and for new thoroughfares; designs for new public buildings submitted in competition. For the purpose of training recruits for the work of this Council, two young architects (called *auditeurs*) attend at the bi-weekly meetings, and they are entrusted with certain subordinate duties, receiving an honorarium of £50 a year. Such young architects, who are selected from those who have won the Grand-Prix-de-Rome (École-des-Beaux-Arts) and completed their four years' residence abroad as Academy Travelling Students, are usually appointed soon after their return to Paris. They are generally also nominated to fill the first vacancy which occurs as assistant or *inspecteur* on a State building in course of erection, and so at once become attached to the service of the Government, at whose expense they have been trained, and in course of time, with diligence and attention, are enabled to rise to a position of respect and importance. The staff of assistants attached to the Council consists of six controllers, a sub-controller, and estimating clerks (*calculateurs*), at salaries ranging from £80 to £280. Twelve *inspecteurs* and a clerk of works are employed to inspect the various works in progress, and generally to assist the Inspectors-General, who are responsible for the erection of the works in accordance with the approved drawings, &c. The total annual cost of the Council and its *agences*, which have such varied and far-reaching duties, amounted in 1887 to £6,050. In matters such as railways, bridges, or canals, the Minister of the Interior consults the Conseil-Général-des-Ponts-et-Chaussées, such advice being usually followed.

Commission des Édifices Diocésains.—The experts who compose the Commission appointed to advise the State in architectural matters relating to Diocesan Buildings are M. Vaudremer, Membre-de-l'Institut-de-France, M. de Baudot, and M. Corroyer, assisted by M. Bœswillwald, Inspector-General of Historical Monuments. Their duties consist in examining the reports submitted by the diocesan architects, in advising as to the distribution of funds, and in periodically visiting works in progress, in order to ascertain that the authorised plans are being faithfully executed. The office of member of this Commission, giving the title of Inspecteur-Général-des-Édifices-Diocésains is honorary, travelling expenses being allowed.

Commission des Monuments Historiques.—The members of this Commission are painters, sculptors, and architects, the principals of some of the museums, members of the Chamber of Deputies, the Prefect of the Seine, and other functionaries. A Minister of State presides at the meetings, and membership is wholly honorary; but the Inspectors-General of Historical Monuments are allowed their travelling expenses and an honorarium for the time occupied in their periodical tours. The work and duties of the Commission have been previously described under the sub-heading of "Historical Monuments." Copies of all the measured drawings and technical reports of these buildings made by the various architects employed upon them are preserved by the Commission; and a most interesting collection, representing the state of the buildings, both before and after restoration, has been made, a portion having

been published. Monsieur Viollet-le-Duc, son of the late distinguished architect, is the secretary to the Commission, and chief of the department in charge of the historical monuments. He has summarised, in a report on the work of the Commission, the beneficial results of their work. For instance :—(a) Specimens of national art in their best period have been preserved ; (b) The money spent has been the means of creating a body of skilled workmen by the close study of ancient work and the intimate relations with, and immediate superintendence of, the ablest architects ; (c) Of the whole expenditure, about sixty per cent. is paid for labour ; (d) The wealth of the nation has been augmented, and facilities for study preserved for future generations.

A collection of architectural casts established in the Palais-du-Trocadéro, Paris, is one of the most recent and valuable outcomes of the labour of the Commission of Historical Monuments. The museum has been organised (within the last ten years) to illustrate chronologically the history of architectural sculpture in France. Casts have been made of the finest specimens selected in the various provinces, in order to demonstrate the local characteristics. These examples (which comprise reproductions of marble, stone, wood, iron, and bronze) are labelled, dated, and supplemented by an admirable series of photographs. The list of buildings scheduled as "Historical Monuments" also furnishes useful information as to the whereabouts of the most important specimens of old work in each locality.

The building laws of France appear to encourage enterprise in central districts by concurrently restraining and protecting investors, so that it may be broadly stated that the accommodation is more in accordance with the recent developments of construction and planning, and more adapted to meet the requirements of modern life, than is the case in London. The French residential system affords opportunity for persons of equal social status, but of different degrees of wealth, to live in close proximity. By the same principle, it enables commercial and professional men, whose business requirements may be widely different, to find suitable accommodation in the same building. In the commercial districts of Paris few buildings are erected of less than the maximum permitted height, as the cost of subsequent alteration is a serious consideration. It therefore follows that the enlargement of premises for either business or residential purposes must be horizontal. Such extension, being only possible on the acquisition of adjacent land, is consequently a most difficult and costly proceeding. A prosperous man wishing to increase his premises finds it, therefore, more economical to take land in some new thoroughfare rather than attempt to negotiate with his neighbours ; and thus there are always purchasers or tenants ready to establish themselves in the new streets constantly being formed to meet the demands of increasing traffic.

That some of our new London streets do not afford scope for material improvement is largely due to the fact that a short-sighted policy often reduces the amount of property acquired by the promoters to the barest limits needed for the intended thoroughfare, so that investors who have the spirit to take up the frontages have often

to face the extortionate demands of adjoining owners for the acquisition of property which before the new street was formed had but insignificant value, and rights of ancient lights thwart operations in a most tyrannical manner.

In the initiation and control of buildings for the public service, or in which public money is to be expended, some sacrifice of independence is undoubtedly felt by architects and promoters alike, and often vexatious delay is caused in the transmission of the plans and estimates from the Prefect to the Ministers, and then to the Council for Civil Buildings for examination, before approval is obtained. In the result, however, much is gained, for the schemes are looked into by independent but friendly critics, and sometimes timely interference prevents the erection of unsuitable buildings, or, what amounts to the same thing, buildings on unsuitable sites. And again, in the laying out of new thoroughfares, &c., considerations of general importance, overlooked by local bodies, may be provided for by the Council, whose technical advice and approval give a sense of security for success, and certainly seem to have prevented the failures which occasionally occur where such precautionary measures are ignored.

I conclude my report by respectfully submitting that the course adopted with eminent success in Paris should stimulate the efforts now being made to educate the British public, and bring Londoners to a knowledge of the fact that the community at large is benefited by the judicious control of building operations and by expenditure wisely incurred in municipal improvements. Spacious, well-planned thoroughfares facilitate rapid communication and the transaction of business; they also promote the health, and therefore the wealth, of the inhabitants, by affording them the enjoyment of more sunlight and a freer circulation of air. Good approaches to the great railway termini would tend to promote traffic in the suburbs, to the relief of the congestion of our central districts. Well-to-do inhabitants could live in our city with greater comfort than at present, the poor would be less restricted in their choice of residence, as rapid transit brings them quickly to their work. Parisians envy us our Inner Circle Railway, but even this, in conjunction with our other railway services, might be made of greater value. London possesses immense natural advantages: a tidal river, a good subsoil and water-service, facilities of drainage, and cheap building materials. It now needs some comprehensive treatment not only to render it worthy the metropolis of the nation, but to make it more agreeable and commodious to its inhabitants, and a better centre for commercial activity. Such an undertaking would give scope to a large investment of capital, and would afford useful and profitable employment to a large class of artisans and artists, on whose education vast sums of public money are being expended, with but slight results to the nation, for little is done to utilise their improved acquirements on national works.

FRANCIS HOOPER.

*. The discussion [see JOURNAL OF PROCEEDINGS, Vol. V., pp. 69-72] which followed the reading of Mr. Hooper's Paper treated principally of the English administrative system, and only referred incidentally to the main subject of his Paper.

LV.

MUSICAL REQUIREMENTS IN CHURCH PLANNING.

By JOHN BELCHER, Jun., *Fellow*.Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

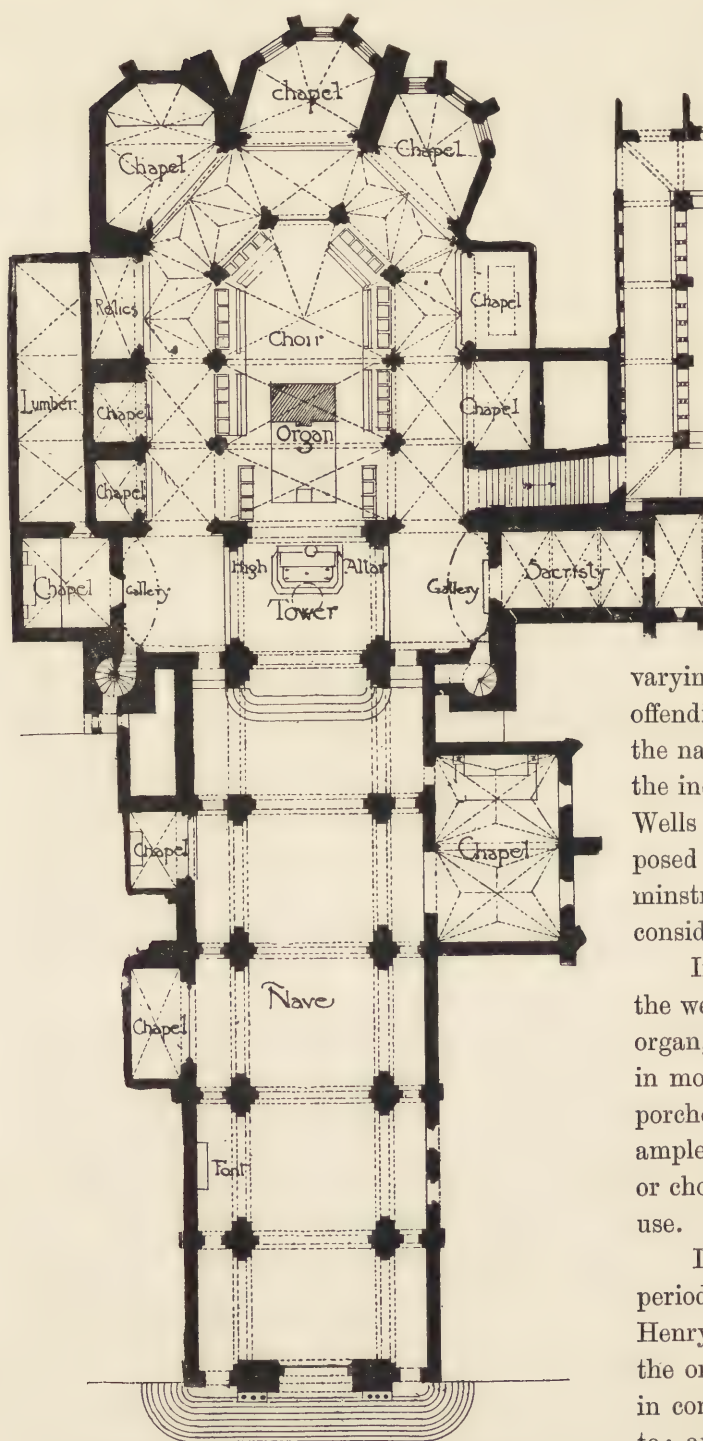
MR. PRESIDENT AND GENTLEMEN,—

THE fact that considerable activity has been displayed of late years in the development of ecclesiastical music may be sufficient excuse for bringing forward certain problems which consequently force themselves upon the attention of the architect; not only have we surpliced choirs to provide for, but these are supplemented, on occasion, by large bodies of voices; not only are boys' voices, but female voices are in requisition; not only an organ, but an orchestra may be employed; and the position of voices and instruments in the church, both in regard to their relation to one another and to the congregation, has henceforth to be considered.

Organs were first employed for ecclesiastical purposes in the seventh century, and in the tenth century St. Dunstan gave organs to several churches in this country. They were, however, small, and often used in conjunction with other instruments. The development of the organ was no doubt partly due to economical considerations, for one pair of hands could secure an approximate effect by a combination of stops representing the several instruments hitherto employed.

The viol-di-Gamla, hautboy, flute, bassoon, clarionet, and trumpet stops are familiar to all, and the instruments they represent remained in use in many a country church until very recently, and long after the organ had usurped the entire business in our cathedrals.

In small parish or village churches the minstrels' galleries may now occasionally be found, though for the most part they have, in the process generally known as "restoration," been removed. The west end was the favoured position, partly on account of structural reasons, and partly that the attention of the congregation might not be diverted by the vagaries and antics of the instrumentalists and singers. The



SKETCH PLAN (SCALE ABOUT 48 FEET TO 1 INCH) OF
SAINT-TROPHIME.

[Measured, in 1887, by Mr. A. Needham Wilson, *Associate*.]

western gallery remained in use when the minstrels gave place in turn to the barrel-organ, and then to the manual or keyed organ. The gallery subsequently formed a convenient situation for gathering together the charity children. Here they could be decently separated, as became their state of life, from the worthies in a higher sphere; and were, moreover, well under the control of the usher, who with a long wand would execute musical raps of varying pitch upon the heads of offending urchins. The gallery in the nave of Exeter Cathedral, and the indications of similar ones at Wells and other places, are supposed by some to have been for minstrels; but on this point I feel considerable doubt.

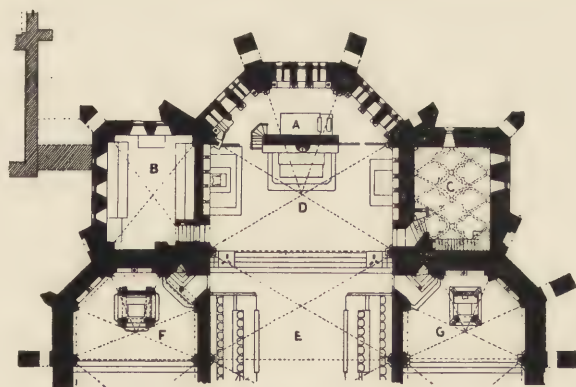
In Roman Catholic churches the western gallery is retained for organ, orchestra, and singers, for in most instances there are deep porches or towers, which give ample space; but a small chancel or choir organ is also generally in use.

During the Reformation period, between the reigns of Henry VIII. and Queen Elizabeth, the organ, with other instruments in combination, was still adhered to; and it was no doubt due to the proficiency of Henry and his family in music that instru-

mental music at least was not then abolished. Calvin bitterly opposed all choral services, and the objection of the Puritans to the use of instruments and organs was so strong (as being Jewish and Popish), that they continually asserted, "one single groan in the spirit was worth the diapason of all the church music in the world." As a result of their exertions, in 1643 nearly every organ in use had been destroyed,* and it was not until after the Restoration that the organ regained a place in our cathedrals, and has, in fact, become recognised as an essentially ecclesiastical instrument. Originally the organ was little more than a piece of ecclesiastical furniture, and was probably first introduced into the chancel on the floor, or on wheels, like the small processional organs at St. Peter's, Rome.

At Saint-Trophime, Arles, the small organ probably still occupies its original position immediately behind the high altar [see opposite]. In other places, and in this country after the Reformation, the rood-loft was very generally adopted as a convenient place, and when large enough also accommodated the singers, as at Norwich and Southwell. The rood-loft position for the organ is shown in the view of the Franziskaner-Hofkirche at Innsbruck [Illustrn. vi.].

Though the organ eventually crowded out the choristers, still the choral services of our English cathedrals, being wholly conducted in the choir, did not call for any great increase of organ power; and it is only as late as fifty years ago that 32-ft. pipes were first used in England at York Cathedral, where they had to be distributed in the chancel aisle. On the Continent, however, organs became very large at the close of the fifteenth century and the beginning of the sixteenth century, reaching a climax in the eighteenth century. In the majority of instances they were forced



PLAN OF EAST END OF RATISBON CATHEDRAL.

A, Organ. B, Sacristy. C, Lower Treasury. D, High Altar. E, Presbytery. F, G, Chapels.

to migrate from the chancel to the west end; but in some they were placed in the transept, or, when neither position was available, they were relegated to the triforium of the nave. At Ratisbon the organ, though increased in size, retained its original

* Organs which escaped the general demolition were those of Durham, York, Lincoln, Tewkesbury; St. Paul's, St. John's, and Magdalen Colleges, Oxford; and Christ's and King's, Cambridge.—J. B.

position behind the altar at the east end [see plan on preceding page]. The organ in the chapel at Bückeburg is also a good example of a similar arrangement [Illustrn. vii.]. Without enlarging upon the historical part of my subject, I pass on to consider the position and requirements of the organ in churches of the present day.

Now that the village singers and charity children have so generally given place to the surpliced choir seated in the chancel, the position of the organ near them seems essential. The organ, however, has other duties to fulfil. It has not only to support and accompany the choir, but also the congregation, and sometimes to do duty with an orchestra, and, further, with large bodies of singers in addition. These eventualities we are called upon to face and arrange for in the future. Indeed, the increasing facilities for musical training, the cultivation of every branch of the art, and the consequent raising of public taste to a higher standard of excellence, are factors which will determine and insist upon some development in church planning; and in erecting churches of average dimensions in the future the architect is bound to take these musical requirements into consideration.

As the organ, from its bulk and size, somewhat governs these arrangements, it may be well to consider first what organists and organ-builders look upon as its essential requirements. First, it must have ample space to speak in. It should be placed in a position not less, or much less, in height than the nave and transepts, in order that the sound may be properly diffused throughout the building.

It follows, therefore, that the so-called "organ-chamber" is a mistake—as, indeed, are all modifications of this attempt of the architect to treat the organ like the gas-meter or heating apparatus. Too frequently it is crammed under a low arch, with a few pipes bursting and protruding for ornamental reasons, and which are quite likely to be but dummies, while their speaking brethren are smothered behind in the chamber.

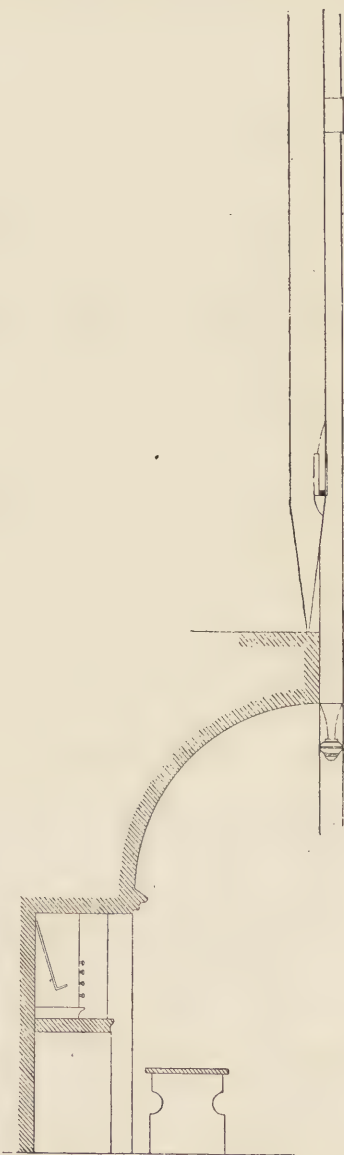
Again, it is erroneous to imagine that the size of an organ is entirely regulated by the size of the building. Its size is determined by the number of "stops." These are to give diversity and change of tone rather than volume of sound. The extent of its loudness is regulated by their combination. Organists consider that *in all cases* a good foundation-tone should be secured, and for this speaking-room must be provided for 8-ft., 16-ft., and even 32-ft. pipes on the pedal organ; and these dimensions have to be borne in mind in order to provide sufficient space.

While deprecating any compressing or smothering of the organ in a vault or chamber, I by no means consider that some sheltering of the tone is not necessary. By such means mysterious and poetic qualities of tone are fostered, and the rolling and clinging of the sound—so pleasant to the ear in buildings of large dimensions—may be secured. For this reason the top of a chancel-screen, or rood-loft, or any such arrangement, cannot be recommended as affording a suitable position for an organ of any size. This treatment may possess many attractions from an artistic point of view, but it is prejudicial to the organ tone, which is sure to be somewhat harsh and

crude when placed in the open nave, and where the nave is used for seating the congregation it quite overshadows the sound of the choir voices.

Organists and organ-builders generally consider that in churches of any pretension to size the organ should be raised above the ground about 12 ft.; the object being to enable the sounds to blend before reaching the auditors; though if it is placed too high the tone alters in character, and in fact becomes reflected sound. It follows, therefore, that such positions as above the chancel arch, close under the roof, or above the triforium, are detrimental to some of its finer qualities, however artistic its appearance may become; in either case the difficulty of dealing with the pedal-pipes is sure to lead to their separation and dispersion, and, in consequence of this mangling, the instrument no longer retains its corporate existence. For similar reasons a divided organ cannot be recommended—for, if an organist is to manipulate the instrument rightly, he must be in close proximity to it as a whole. If he is removed to a distance from it, or from any part of it, he is apt to lose control, and ceases to make his presence felt; mechanical contrivances, such as electricity or pneumatic action, also become necessary, and these, I believe, are somewhat destructive of true organ touch and expression. The keyboard and organist's seat should be free of the organ, though close to it, but neither within nor under it. A very favourite arrangement, adopted partly to economise space and partly on artistic grounds, is to seat the organist under a "cove," with the pipes projecting over his head. Any such position is objectionable, as he is unable to judge rightly of the weight of sound or the effect of his combinations.

Another architectural consideration in planning the position of the organ is to provide proper and easy access to every part for repairs and tuning. Attention should also be given to the position and space for the "feeders," so that the wind-supply can be conveniently arranged, and "blowing the organ" by any of the modern methods adopted in a way not to be overheard in the church. Whatever motive-power is employed it should be utilised also for working a small dynamo, so that incandescent electric lights may be distributed in various parts of the organ, and easily brought into use by a switch, and the great danger involved



OBJECTIONABLE FORM OF COVE.

in the use of matches and candles for tuning and repairs in a highly inflammable construction be avoided.

That an equable temperature should be secured for the organ is another important consideration. Of necessity it should be protected from outer doors, windows, or open roofs; and when placed against an external wall it is advisable to board the wall on 3-in. battens, leaving the boarding open above and below so as to allow a free circulation of air between it and the organ, and this arrangement adds to the resonance of the organ.

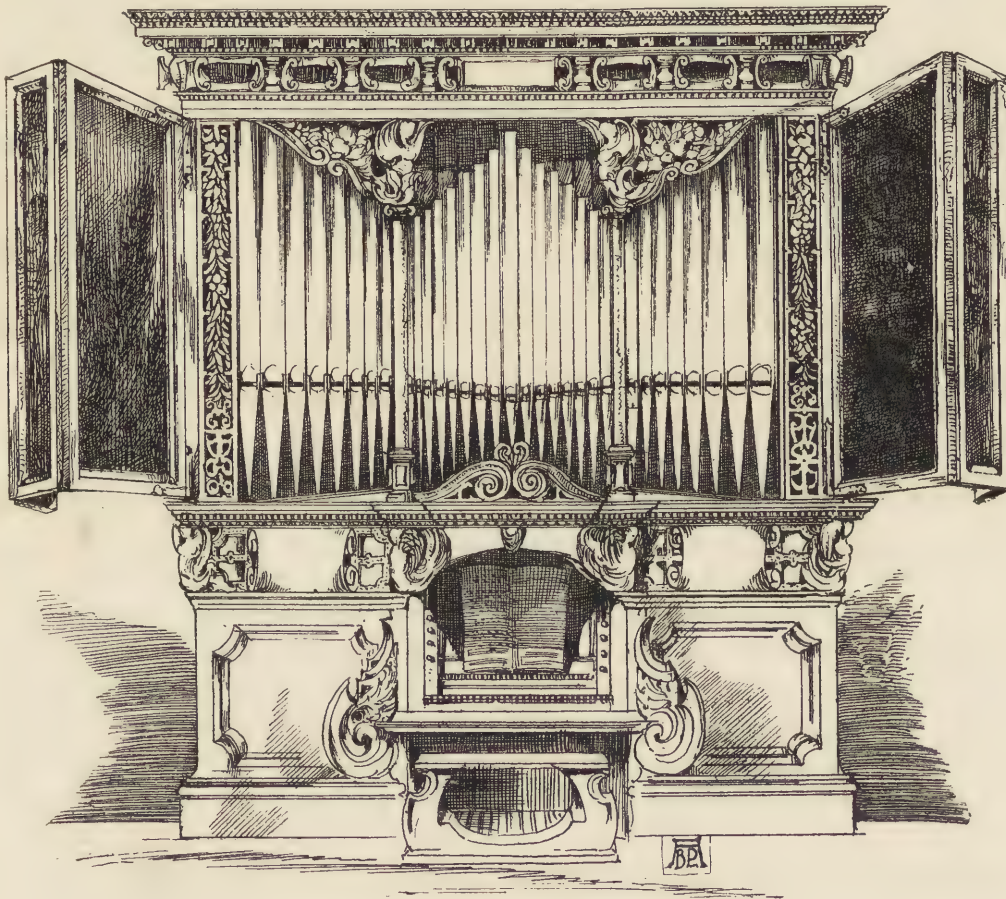
Having briefly stated its requirements, I may now appropriately refer to its accessories, such as the case or enclosure. There are two methods of dealing with the organ-case. It may be treated as an enclosure, having no special relation to its contents, which it may wholly or in part conceal—a form usually adopted by the Italians, who shut in the front with shutters or curtains; or in the general, and I think appropriate, way of using some of the pipes themselves as decorative features in a frame enclosing the other parts of the organ. The pipes thus express the object and contents of the case, but they should be treated as part of, and not adapted to form, the case, which should of itself completely frame in the pipes of each front. The lines of the case may be broken up, grouped, and otherwise varied in form, but should always have cornice, turrets, or ornamental finish above the top of the pipes. The unsightly and naked exhibition of pipes protruding through the top of a so-called “case,” but which is in reality nothing more than a pipe-holder, is objectionable. A case should be something more than a mere prop to hold together a bundle of pipes, which often appear exceedingly like rows of gigantic lead-pencils banded together.

I would also protest against the use of wrought- or cast-iron in the construction of the case. The idea seems to set one's teeth on edge; the hard, cold, unyielding material cannot vibrate in unison with the soft and mellow organ-tones. Wood is a material in sympathy with the organ, and the most consistent for the construction of its case. It is capable of infinite variety, and in the treatment of the scroll-work, shades, or spandrel-pieces, which in good examples fill up the space between the ends of the pipes and the cornices, there are delightful opportunities for the exercise of skill in ornamental design. Most are familiar with the beautiful organ-case at Perpignan, in the south of France, which dates from the last years of the fifteenth century, and that at Hombleux, in the north, which dates from the early part of the sixteenth, both illustrated by Viollet-le-Duc. But the Renaissance organ-cases, when the organ began to assume greater importance and size, are pre-eminent. Their ever-increasing size, however, caused the abolition of the large shutters, which was a beautiful feature of the old Gothic cases, for they afforded an opportunity, which was never neglected, of introducing colour-decoration and figure-subjects illustrative of music and praise.

Small organs might be more frequently and extensively used in large mansions with music-rooms, if organ-builders would take a hint from my illustration of a chamber-organ with shutters. Instead of being a miniature Gothic cathedral design, or a vulgar exhibition of highly-coloured and obtrusive pipes arranged in a pitchpine, stop-chamfered case, it might be allowed to have a character of its own. By an

arrangement such as I suggest, it might be converted into a work of art. Its painted shutters would not only be an attractive feature, but when closed they would preserve the organ from dirt and the dust of frequent sweepings and cleanings [see below].

There are yet other considerations which assist in determining the best position for the organ: so slowly does sound travel that any division of choir, organs, or orchestra is destructive of precision in proportion to the distance that separates them from each other. They should therefore be compactly arranged and as far as possible on the same plane.



DESIGN FOR A CHAMBER-ORGAN WITH PAINTED SHUTTERS.

It is unadvisable to place the organ in a transept between the choir and congregation, as it will be found that the sound-waves contend unpleasantly.

Instruments should not be separated from each other by the voices, and the orchestra should be adjacent to the organ, especially when small, as it should be under the immediate control of the organist.

Taking these points into consideration, I have suggested [Illustns. viii., ix., x.] an arrangement which is intended rather to illustrate my meaning than to represent a

fully worked-out scheme. To meet the requirements I have enumerated, the organ is placed in a special transept, east of the great transept, and equal in height to the rest of the church, and which also forms the western end of the morning chapel. So that the organ is virtually open on three sides, yet from its position slightly sheltered. Outside the main wall, and between the buttresses, a staircase with wide landing serves as a tuning-place for the orchestra before entering the gallery, which, projecting into chancel, gives space for an orchestra, which may be extended eastwards on occasion. Under this tuning-place there would be the gas-engine or other blowing apparatus. The floor of the organ proper is twelve feet from the ground. The music gallery is lower, and as the floor of chancel is raised by steps similar to the effective arrangement that existed at Santa-Maria-dei-Miracoli,* Venice, all the performers are brought into close relation with each other and the organ. The usual north transept affords an excellent position for grouping large bodies of voices for oratorios, &c., or for a gathering of choirs on festivals, adjoining the organ and orchestra, and easily under the control of a conductor at the western angle of gallery. A corresponding gallery on the opposite side of the chancel would provide a suitable and convenient position for female singers at ordinary services [see plan, *Illustn. viii.*].

There are infinite variations to such a treatment : some may be suggested by peculiarities of site or requirements of the congregation ; others adapted to large buildings or modified for smaller. Some may be necessitated by the want of adequate means. My object has been, not so much to offer a uniform solution to an ever-varying problem, but to bring before you the results of my investigation of the musical requirements of churches, in the hope that they may prove at least suggestive in dealing with and providing for the probable requirements of the not distant future.

Mr. H. W. Brewer's drawing published in *The Builder* a few years since, and other similar treatments of the rood-loft position of the organ, are seductive enough to the architect, and I imagine that Sir Christopher Wren was prejudiced against the "box of whistles," rather than the screening of chancel, for one of the charms of good work lies in the peculiar veil of mystery which is gained by such means. It is, however, difficult in a moderate-sized building to form a loft under which the congregation can see the chancel, and above which there can be space left for an organ of any size. The rood-loft in the Franziskaner-Hofkirche, at Innsbruck, is an example of how the organ is crowded [*Illustn. vi.*]. There is an admirable example of the adaptation of the rood-loft for musical purposes at St. Agnes', Kennington. Here the organ is placed at the north end of the screen, and the remainder is utilised for a small orchestra. The organ is necessarily small, and sounds crude and harsh ; this may be accounted for, as has been suggested, by the inferiority of the organ, rather than its position. The beauty of the organ-tone in Ratisbon Cathedral may not be entirely due to its own merits, but to its position, for, placed in the apsidal east end, which is without aisles, the form of the roof necessarily assists the sound in its direction to the

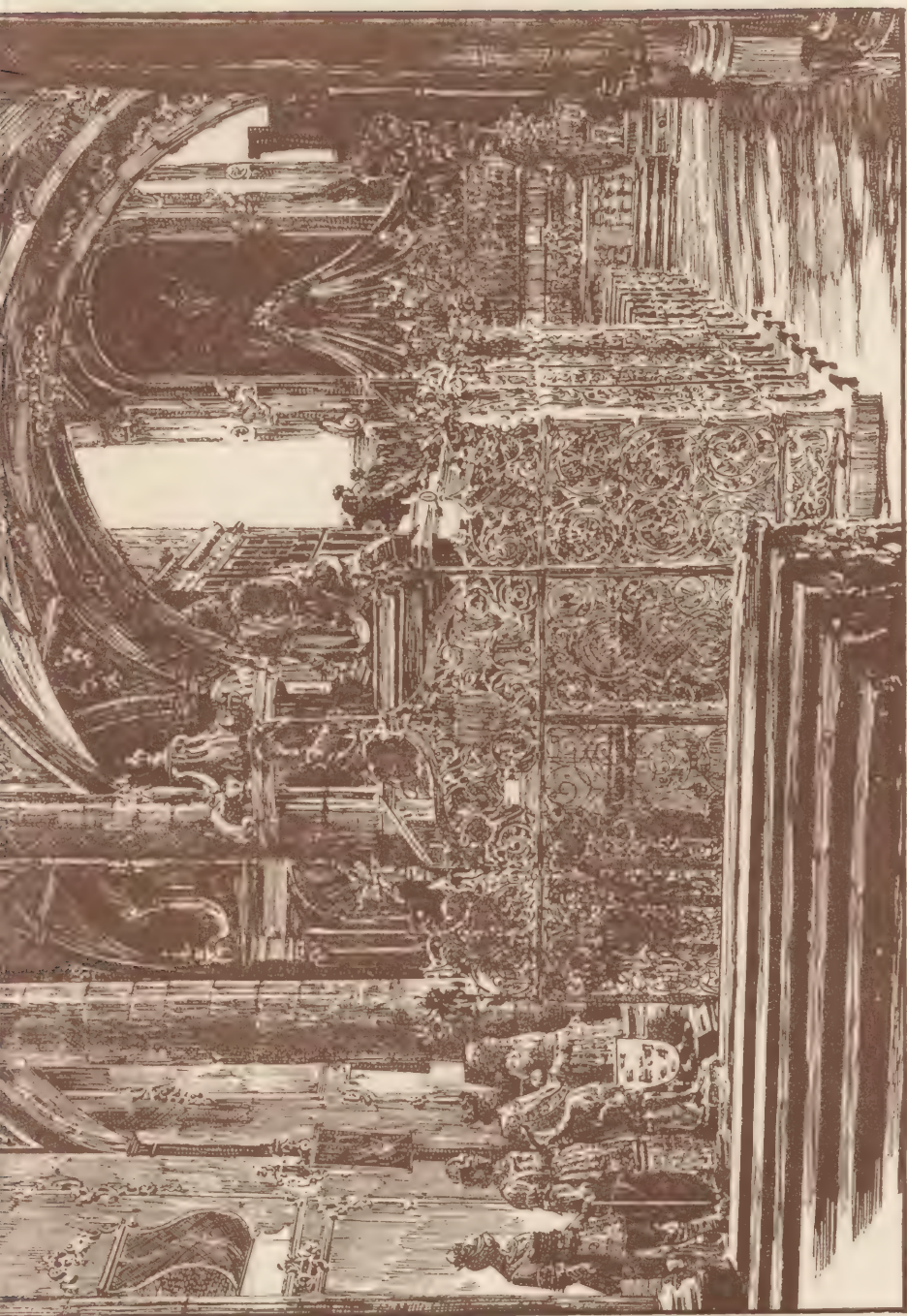
* See a sketch of this interior, before restoration, in *TRANSACTIONS*, Vol. IV., N. S., p. 148.



TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS. VOL. V. NEW SERIES.

LV. MUSICAL REQUIREMENTS IN CHURCH PLANNING (vi).





A. Needham Wilson del.

THE FRANZISKANER-HOFKIRCHE, AT INNSBRUCK, ERECTED A.D. 1553-63.

Showing the position of the Organ (pages 35 and 40).

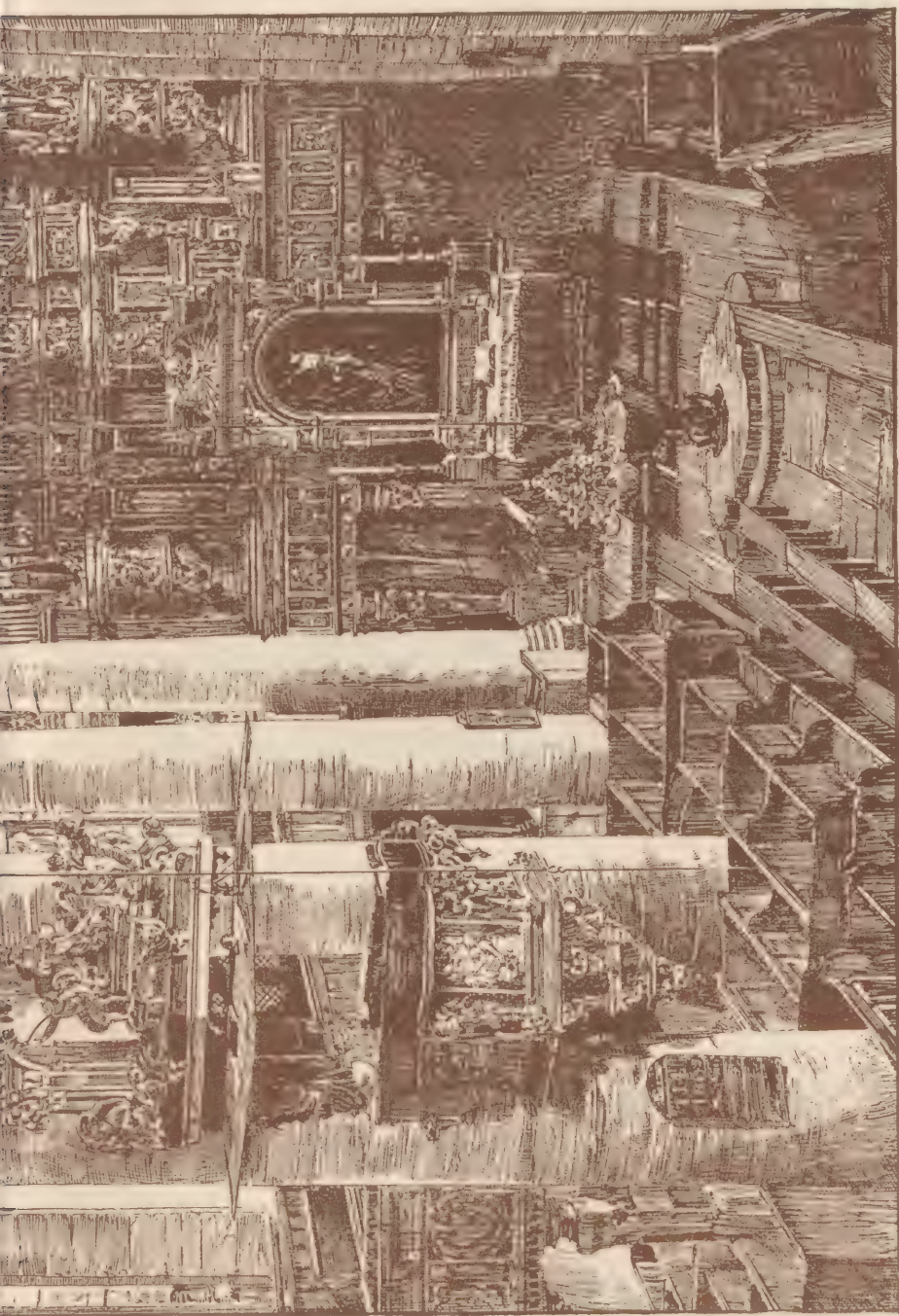




TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. V. NEW SERIES.

LV. MUSICAL REQUIREMENTS IN CHURCH PLANNING (vii).

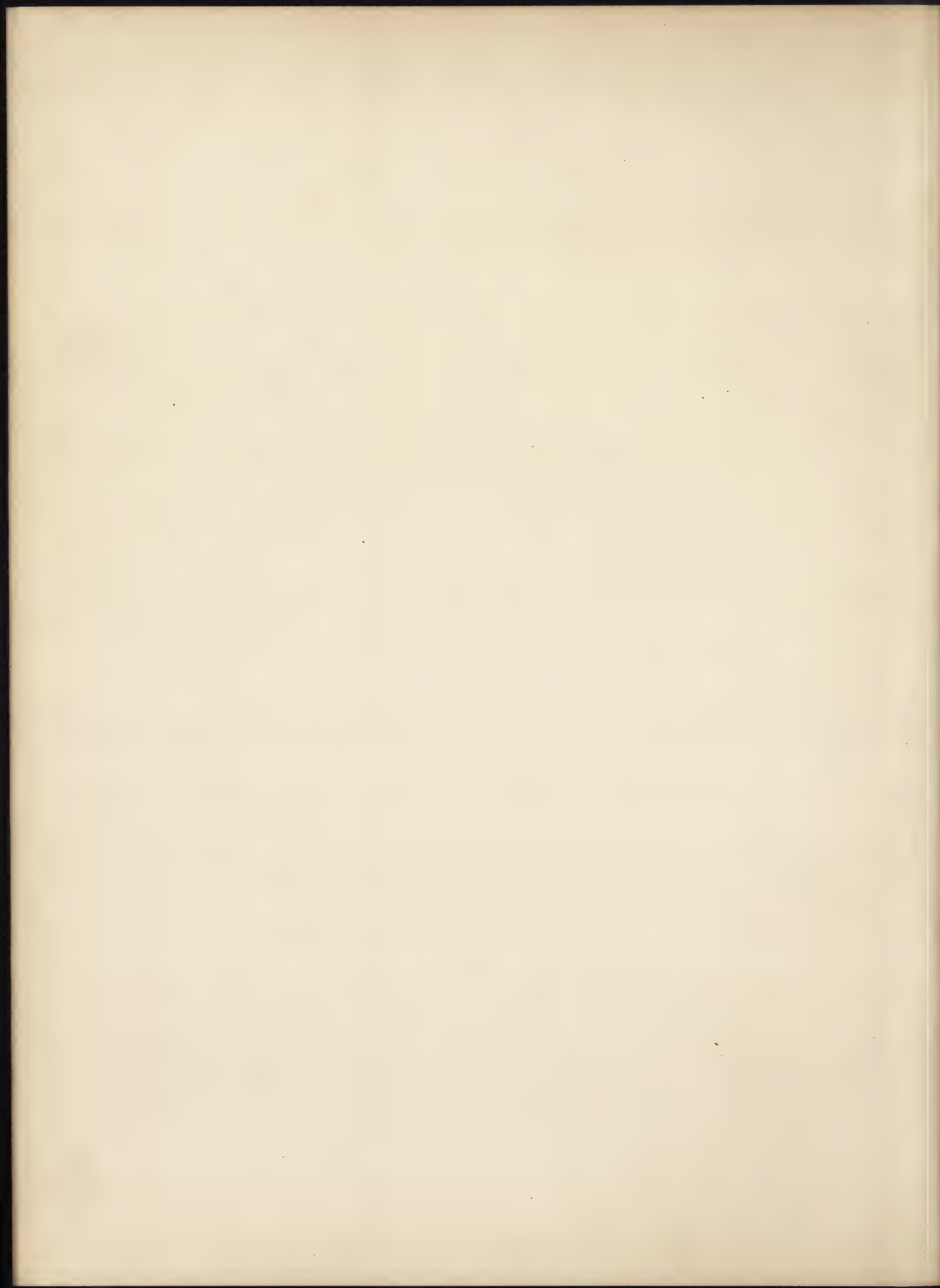


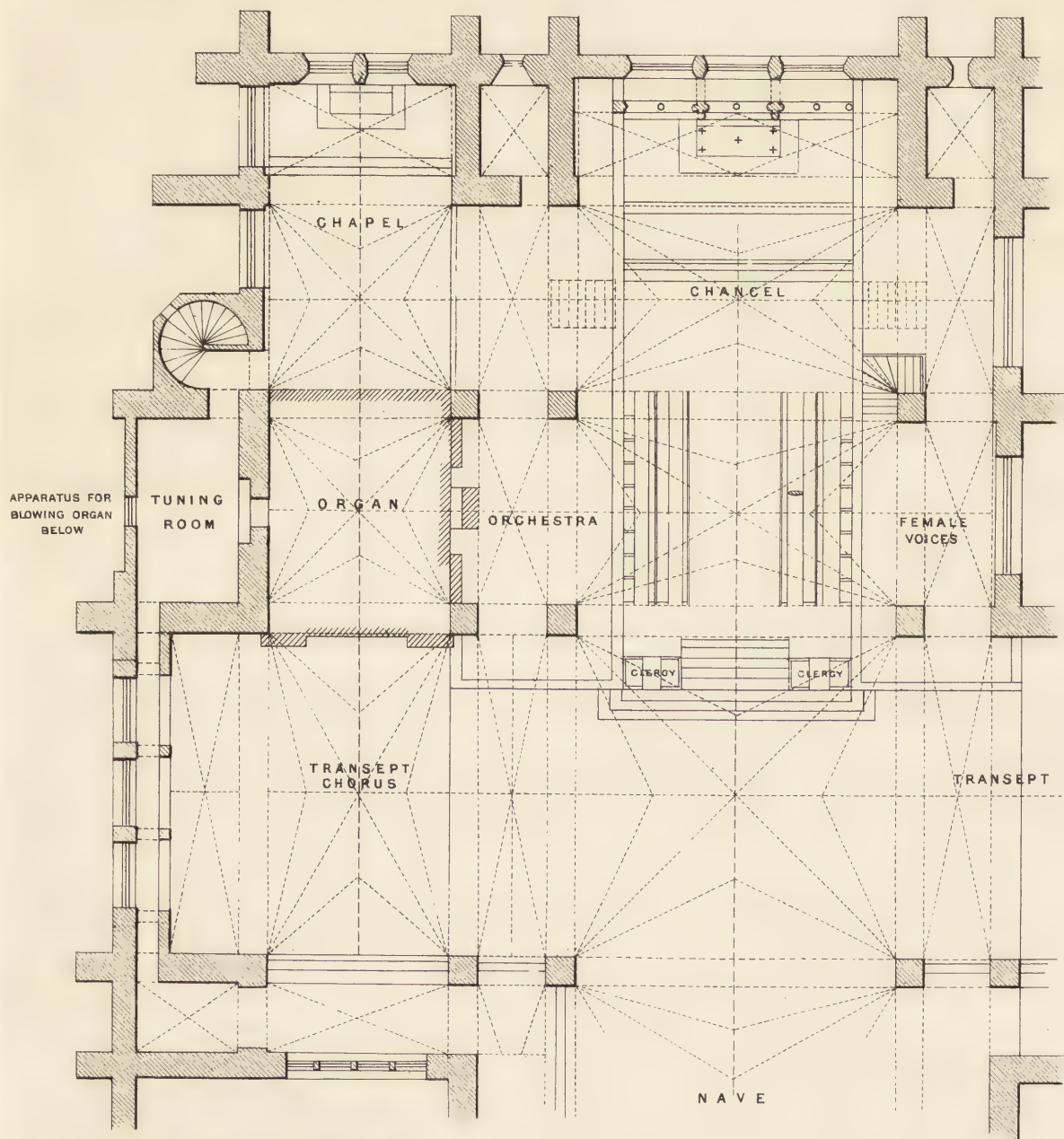


A. Needham Wilson del.

THE CHURCH AT BÜCKEBURG (SCHAUMBURG-LIPPE), ERECTED A.D. 1613.

Showing the position of the Organ (page 36).



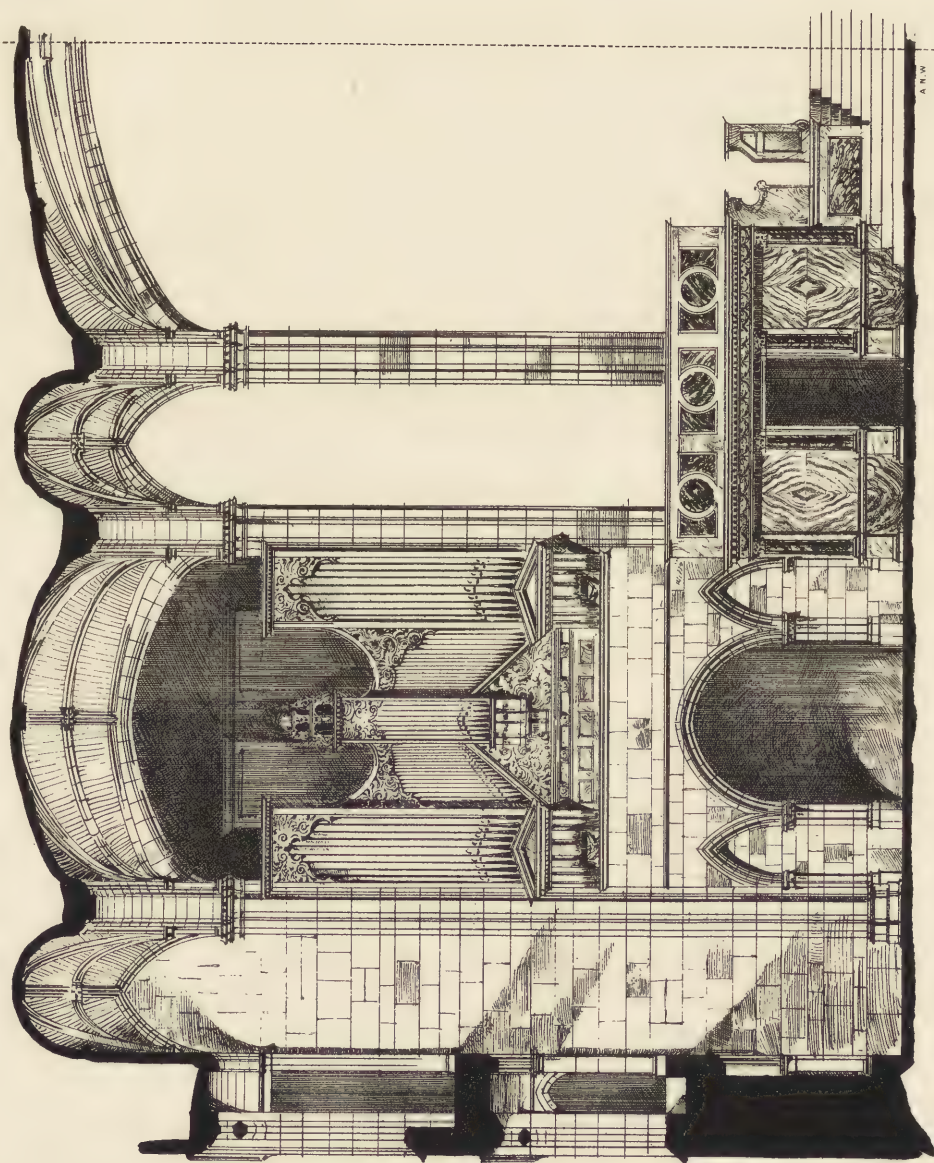


Scale, One sixteenth of an inch to a foot.

PLAN OF MR. BELCHER'S DESIGN FOR ORGAN ARRANGEMENT.

See Page 39.





Scale, One eighth of an inch to a foot.

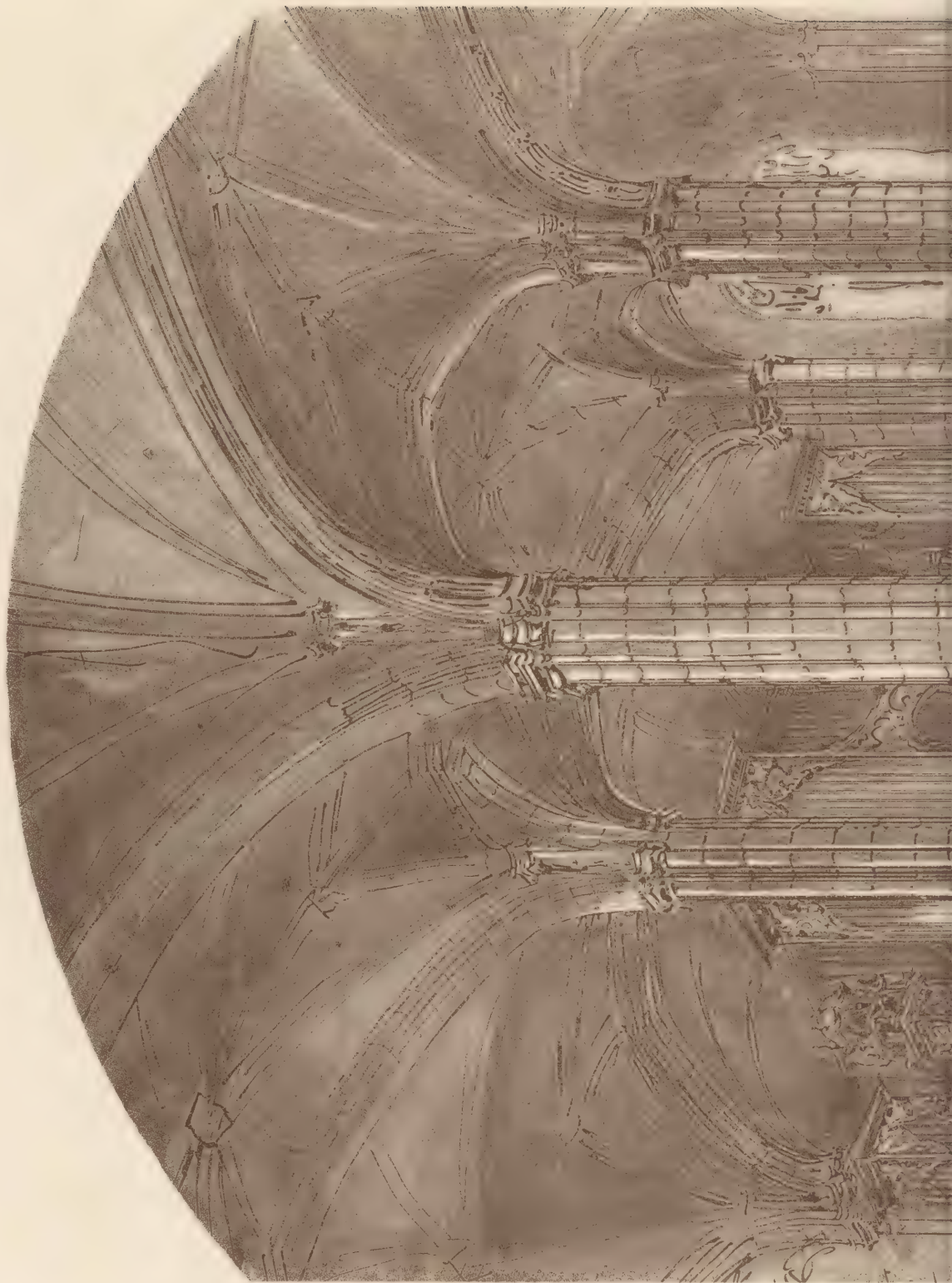
SECTION OF MR BELCHER'S DESIGN FOR ORGAN ARRANGEMENT.

See Page 39.





TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. V, NEW SERIES.
IV. MUSICAL REQUIREMENTS IN CHURCH PLANNING (x)





SKETCH OF MR. BELCHER'S DESIGN FOR ORGAN ARRANGEMENT.
See Page 39.



nave. The acoustic properties of the building are also celebrated, and are partially accounted for by the continuous walls and by the fact that the transepts do not project beyond the aisles.

In a large church the use of a powerful organ at the west end for congregational purposes and the employment of a choir organ in the chancel have attractions; but if both are to be under the control of an organist seated in the chancel, then the difficulties I have pointed out must necessarily arise. I have no right to dispute with organists on the question of "touch," but I may be permitted to enlarge upon my reason for objecting to the use of electric or pneumatic action. That there is a subtle distinction between the sound of a note struck on the pianoforte by the finger, and one struck by the mechanical point of a barrel revolved by hand, is admitted—one is vital and the other dead. There is the same distinction between sound produced from instruments by human breath, and from the same instruments by mechanical wind-power. Is it unreasonable to suppose that there must be some loss when electric or pneumatic action is interposed, and another force is put to do the work initiated by the primary action of the finger? But what are the advantages claimed to compensate for what appears to me this loss of vitality? It makes it possible to place the console away from the organ, and it is suggested that the organist would thus be better able to judge of the effects produced. These are questionable advantages, and contain elements of danger.

Would it be wise, for similar reasons, to place the conductor away from his orchestra? One's natural deduction from experience is that the workman should be close to his work if he would have a firm grip and control of it.

Apart from such considerations, however, there is one important factor which must not be overlooked—viz. sound itself, which travels so slowly that if the organ is at the west end and the player at the east end of a church it would not reach the organist's ears until he was engaged mentally and with his fingers in producing the successive and progressive notes; and a few bars of semiquavers would, I imagine, reduce him to a distracted and mixed condition of mind. Another suggestion which seems to me to call for further remark is, that if the organist cannot be placed at some distance from his organ, so as to hear it as others hear it, then it is suggested he had better be placed under the front pipes, so that he may hear less than others and more of the choir. In such a case I think he is liable to make ill-advised combinations, not being able to judge of the relative strength of his stops. The player should hear the full force of his instrument so as to be able to control and modify his effects. Were this the case always, we should probably be spared much of the modern "roaring" on high wind-pressure stops, and be permitted to know more of what the singers were presumably engaged in. I very much sympathise with those who advocate a moderate-sized organ: when beyond a certain size an organ becomes more than one mind can compass. Let the development be in the combination of many minds, each concentrated on his own instrument in the orchestra combined with the organ.

It is important to bear in mind—and without this explanation the chief point of my Paper may be overlooked—that I am not treating of the position of organ and

orchestra in buildings already erected, or with the necessary makeshift arrangements for placing them in churches which may be old or cruciform ; but I am pleading for a new departure which will not necessarily interfere with the architectural cruciform design, but will meet modern requirements. Only as these become better known will proper provision be made for them, and the opportunity occur to develop new and beautiful features in design which may mark our epoch.

JOHN BELCHER.

[Notes by H. H. STATHAM, *Fellow.*]

1. The old position of the cathedral organ on the screen between nave and choir, which seems to be regarded as condemned both musically and architecturally, I hold to be the finest in both respects that has ever been devised for a cathedral organ. Architecturally, the organ-case, if well designed, forms a very fine object in the centre of the vista ; musically, the effect is so good, from the ample space given for the development of the sound, that (as I can testify from personal experience) an organ which is in reality commonplace and coarse in tone will acquire in this position an apparent richness and mellowness of tone astonishing to the player or hearer who knows what sort of stuff is really in it. The objection to this position now is, that the more enlightened notions prevalent in England now (as they always were in Germany), as to the necessity for a large and weighty pedal organ, lead to the modern organ occupying a much greater space than the older type of English cathedral organ. That is the difficulty, and that is really the only logical reason that can be urged for taking the cathedral organ off the central screen and relegating it to a side position. The larger modern organ might, however, still be kept in the central position in a cathedral, by placing part of it on a lower level within the screen, or even beneath the floor level.

2. It is asserted that organists and organ-builders generally consider that the organ should be raised above the ground about twelve feet. I heard the exact contrary, only a few days before writing these remarks, from one of the most celebrated builders of the day, with whom I was discussing the placing of an organ in a rather unpromising church : " however, as long as we are on the floor," he observed, " we are "all right." The resonance of the floor is a great assistance to the travel of sound, and even to its tone ; and in a comparatively small church it is also exceedingly important to keep the organ below the stratum of heated air which is found, especially at night and in a church lighted by gas, in the upper portion of the building, as the temperature of the air affects its rate of vibration ; and an organ placed at any considerable height above the floor in a moderate-sized church will always be more or less out of tune at the evening service. In the larger area of a cathedral this practical obstacle is of less importance.

3. The idea that with an electric movement there is any disadvantage or difficulty from the organist being at some distance from the instrument is an entire fallacy.

For an organist to be enabled to play at some distance (within reasonable limits) from the instrument is an absolute and clear gain to him: he can hear the effect of his playing as others hear it, which under ordinary circumstances he never can. The introduction of an electric or other automatic agency in opening the valve has no effect upon the tone whatever, and cannot have. On a piano touch affects tone, because in striking the key the player strikes the string through a series of levers, and the sound is louder or softer, and has other differences, according to his touch. In touching the organ key he merely opens a valve for the access of wind, the pressure of which is fixed by other means. Individual touch makes no difference in the *quality* of the sound; it only makes a difference in regard to the clear and precise *sequence* of sounds. In this respect crispness of touch and clearness of definition, in a large organ especially, are materially assisted by automatic action; and when once such action is interposed between the key and the valve or "pallet," whether there be five feet or fifty feet between the two makes absolutely no difference in sound or touch. And while we are being told in London that this long movement between the keyboard and the pipes is impossible and undesirable, we hear from Paris that in the church of Saint-Jacques-de-Hautpas three organs have just been erected, a small one in the choir, and two large ones in other positions, which can all be played by the same player with perfect ease.

4. There are two points that may be noted in regard to organ-case designs. Concurring entirely in the opinion that the pipes, when they form part of the exterior design, should be placed within a suitable architectural framework, I would add that it should be known (it is not generally) that the pipes are not naturally placed in an organ with a large one in the centre, and a regular diminishing grade on either hand, but in the contrary way, the large ones at either end and the smaller ones diminishing towards the centre; and it seems proper that this order should be preserved in the pipes that are shown, as more in accordance with truthfulness of design.* The other suggestion is, that the large square wooden pedal pipes, generally not shown, might often be used with great effect in the design of the case, especially where they can be decorated in colour, for which they afford an excellent ground. A fine use was made of the large wooden pipes by Cockerell, in his design for the organ-case at St. George's Hall, Liverpool, where these large square pipes stand in a semicircle round the back of the organ, affording an effective background to the brilliant combinations of metal pipes in front.

5. The theory advanced that organs should be moderate in size, because when beyond a certain size an organ becomes more than one mind can compass, is simply astounding to any one who understands organ-playing. So far from that,

* The pipes, to coincide with the actual progression of sounds represented by the keyboard, should, of course, range from large ones at the left to little ones on the right, as always seen in mediæval and Renaissance representations of the small organs then known. But in the case of larger organs the effect of this would be that the larger pipes at one end would rob the wind from the smaller ones at the other end; to avoid this, the pipes are divided and the larger ones placed at the two ends of the soundboard.—H. H. S.

the greater the extent and variety of an organ, the more interesting and suggestive is it to the player; and no organ has yet been built which is "more than one mind can compass," unless the "mind" in question is of a very limited order. It is precisely one of the great glories of the organ that it does bring under the power of one mind such grandeur and variety of effect. And it must be remembered that the finest qualities of the organ are only realised when the instrument is of considerable scale and weight of tone (not *noise*, which is quite a different thing). If architects are now going to combine to reduce the size of organs, they may depend upon it that every man with any genius for organ-playing will regard them as his natural enemies.—H. H. STATHAM.

[Note by MR. E. H. TURPIN, Hon. Secretary of the College of Organists.]

To the architect there appear to be two initial difficulties regarding the position of the organ and a concentrated body of vocal and instrumental performers in church. These are, the general want of space, felt alike in large and small buildings—for the eye of the spectator is rarely satisfied in its longing for clear open space; and the fact that the plan of cruciform buildings was perfected when the exigencies of musical performances were of a different and less exacting character than at present. Then, perhaps, the musical difficulty should be named: musical sounds best and most equally permeate space by being thrown forward *en masse*; and this condition, together with the convenience of the performers, and the proper balance of various tones of orchestral instruments, are most completely secured by throwing all sounds forward in the same direction from a position which admits of no escape of tone in any other direction. The natural conclusion from these words would be, placing the organ and other instruments occasionally employed at one or other end of the church. There is a decided consensus of opinion in favour of the west-end position; and the lofty, clear space, not to add the power of the organ in this position as an accompaniment to the congregation, is in favour of that position. An eminent organ-builder, I believe the late William Hill, greatly favoured the idea of an east-end position, with a roof sloping at an angle of forty-five degrees in order to assist in carrying the sound into the building. Seeing that the organ is called upon to perform the twofold duty of accompanying the choir and sustaining congregational singing, it would appear that in churches of any considerable size there should be two organs, one of ample capacities at the west end, and one at the east end of less power and more delicately voiced. This is really a very ancient view of the matter, and one carried out to this day in many of the Continental cathedrals and other large churches. However, it is desirable to concentrate the musical forces of a church towards the centre of the building or in front of the congregation, in order that all the musical offices may be under one control, and the effects of a less dispersed character. Architecturally and musically, the position over the choir-screen has been practically condemned. The old organ in York Minster was moved from the screen for a time in

the seventeenth century, as interfering with the view from west to east; and when Father Smith built the organ in St. Paul's Cathedral, he found himself greatly hampered by the small size of the case, designed by Sir Christopher Wren so as to interfere with the prospect as little as possible. It may be remarked *en passant* that Smith's rival, Renatus Harris, proposed to place a west-end organ in St. Paul's which a writer of the time insisted would throw out sounds "in a manner more amazingly "forcible" than ever before known in this country. The musical disadvantages of the choir-screen position are also obvious enough, as the organ-tones intervene between the voices of the choir and the congregation, and there is not space enough for the musical requirements of modern times on a choir-screen divided and largely occupied by the organ. Mr. Belcher's statement of the conditions of a properly selected position* is characterised by great practical wisdom, and they deserve careful consideration on the part of the architect, organ-builder, and organist. His plan of placing the organ in a special transept east of, and of the same or nearly the same height as the aisles of the building, is also a proposal claiming admiration as a very probable solution of the difficulties of the now threefold requirements—choir accompanying, the support of congregational singing, and the rendering of oratorio music, again brought to its original home, the church. Special care is needed to place musical performers with the organ, neither too high nor too low. The floor of the organ should not be higher than a third, or in a lofty church a fourth, of the height of the building. Want of height, or speaking-room, as sound naturally ascends, is the greatest disadvantage in the modern organ-chamber. Then a large ground-floor space is of great advantage in the arrangement. Though the erection of very large instruments is a matter open to discussion, and it is much more desirable to develop orchestral resources than to build gigantic and overwhelming organs of what has been called the "steam-whistle type," it is nevertheless true that the musical requirements of depth of tone and a large variety of tone-qualities will compel, in the organ of the future, the presence of a proportionate number of pipes producing sounds of 32-, 16-, 8-, and 4-ft. pitch—a condition of affairs which will mean more music and real power, and less noise. So a large space will have to be provided for the organ, in addition to space for larger choirs, not to add space for occasional or possibly, as time goes on, frequent orchestral use. The development of the tubular pneumatic and electric actions will doubtless lead to much economy of space occupied by organ mechanisms, but no inventions will be likely to reduce the space which, under unchangeable acoustical laws, will be still required for many pipes of considerable size, requiring ample speaking-room. The further consideration of a special transept as near the centre of the building as possible would therefore seem to be highly desirable from both musical and architectural points of view.—E. H. TURPIN.

* See Illustn. xi. (erroneously printed "ix.") opposite page 48, showing organs placed on either side of the high altar in the Church of the Knights of St. John at Valletta—an interior, exclusive of aisles and chapels, 187 ft. long, 50 ft. wide, and 63 ft. high—described by Mr. Carpenter on the following page.

[Addenda by R. HERBERT CARPENTER, F.S.A., *Fellow.*]

It is on the whole, perhaps, agreed that the organ should be used rather for the purpose of aiding the choir to lead the congregation, than for the display of its own musical powers—though there are, of course, instances in which the organ may, with advantage, be constructed on such a scale as to fit it for great recitals and special musical services.

The placing of the organ at the east end of a church—a position which has been strongly advocated—has some great advantages in carrying out its chief purpose, and it may, I am convinced, be so arranged as to avoid the, to my mind, very objectionable plan of using the altar and its reredos to mask it. An organ, well treated as to its case and as to the arrangement of its pipes, is so very beautiful a feature, that, so long as its design is kept in proper subordination to the altar, it may be advantageously placed either at the eastern end, or on either side, of the sacrarium, as may best suit the plan of the church and the arrangements of the choir.

In considering the first-named position, which is a very uncommon one for churches, I may instance the organs in the grand church of the Knights of St. John at Valletta, for I am confident that any one who sees and hears them there cannot but feel that, while the artistic effect is beautiful, their music is most perfectly blended with that of the choir. In this great church the two organs are placed in recesses, with projecting galleries, above the returned stalls, against the eastern wall on either side of the apse, now called the Castille Chapel [Illustn. xi.]; while the high altar, as in the basilican churches of old, stands forward, thirty feet from the east wall, west of the choir-stalls, and it has a baldachin suspended over it. The treatment and ornamentation of the cases and of the pipes, together with the galleries and their brackets, are very rich and beautiful in character, and in perfect harmony with the grand architecture and elaborate decoration of this most noble church. This mode, however, of solving the problem set to us could not be very generally adopted, and perhaps not at all in an ancient mediæval church.

Yet, as we are able in these days of progress to make use of either pneumatic or electric action, and to blow the bellows by hydraulic power, some of the more practical difficulties of the problem disappear, and it has thus become possible to arrange the organ either as a single instrument, or divided into two, on one or on both of the side-walls of the sacrarium, with the organist seated near, or in the midst of, the choir.

Instances may be cited of organs anciently arranged within a chamber in some such positions, namely, at Christ's College, Cambridge, where the chamber is on the north side of the chapel, over the vestry; and at Queen's College Chapel, where there is a chamber in the same relative position; while in the ancient chapel of St. John's College, Cambridge, the organ was at one time placed above the chantry of Bishop Fisher, on the north side of the sacrarium, though it was subsequently removed to the "loft" of the ante-chapel. In ancient churches, placing an organ in a side-chamber

may very frequently be found to be the best, and sometimes the only course, when it is of importance that the architecture and antiquarian history of the church should not be interfered with; and it may, without any disadvantage from a musical point of view, be thus placed, when certain necessary conditions are complied with by the architect and by the organ-builder. For these reasons, I cannot accept the opinion that a chamber is necessarily "a mistake," though I agree with Mr. Belcher in his condemnation of some of the chambers frequently erected.

On this important question of "the chamber," I am glad to be able to give (with their permission) the opinions of such eminent authorities as Dr. Mann, the organist of King's College, Cambridge, and Mr. Redhead, the organist of St. Mary Magdalene, Paddington. Both have given careful consideration to the subject, after perusing the abstract of the Paper by Mr. Belcher, and the report of the discussion which followed it. Dr. Mann, writing to me about his own organ, is certain that its position on the screen is the best for such a building as King's College Chapel, as "it allows freedom in everything." And there is little doubt but that all who have heard the grand volume of sound rolling from end to end of the chapel will agree with this opinion. Dr. Mann goes on to say (and I will, as far as possible, give his words):—"The question of organ-chambers must be attended to, as the majority of churches are unprovided with any suitable place for the organ to stand. Also, in nine cases out of ten, it must be at the east end of the church, either in or close against the chancel. The whole character in every way of the music in churches has changed (and still goes on improving) since the old west gallery was the, as it were, minstrel-gallery; and it is especially in old churches that the organ-chamber must be introduced. In some churches, of course, the organ can stand at the east end of the north or south nave aisle (where the distance is not great between the instrument and the choir, or where there are no large pillars to intervene); but even this position has one great drawback—viz., the organ (if of any power at all) is too loud for the people standing close to it; frequently so much so, that the congregation cannot hear the choir. In such cases the alternative of a chamber well constructed is a great improvement, as the organ supports, or ought to support, the choir, and (without being too noisy) helps the congregation, while the short distance between the instrument and congregation tones down the harshness and blaring effect of some of the stops."

Then he proceeds to point out the faults of the organ-chamber, as too often planned, he says, "by unmusical architects," as follows:—

- "1. Not nearly enough width for the instrument.
- "2. The opening (into the chancel) much too narrow for the tone to come out.
- "3. The top of the chamber being far above the top of the arch, so that the tone remains in the roof of the chamber, instead of flowing out.
- "4. The roof of the chamber, consisting of uneven instead of even surfaces."

After drawing attention to these faults, Dr. Mann helps to find remedies for them: thus, with regard to No. 1, he advises as great a width as possible for the chamber, "so that the construction of the organ has not to be cramped; the bellows

"and a great deal of necessary action of the stops can be at the sides, so as to get as much as possible of the sounding part of the organ in the middle of the chamber, rather than at the sides. Frequently the wind-chests (the lungs, as it were) of an organ are not large enough because the organ-builder has not enough room. If you can increase the width of the chamber you enable the builder to put in good lungs, and, by avoiding cramping, you give the pipes room to speak."

As regards the second fault, he advises that the opening between the chamber and the chancel should be "nearly as high as the chamber itself," so that "the inside of the chamber becomes a part of the church, instead of being (as it sometimes is) nearly in another hemisphere."

With regard to the passage of "the tone" of the organ from the chamber to the church, Dr. Mann is of opinion that the floor of the chamber should be of "good thick wood, and that underneath the organ there should be a hollow space so as to become a sound-board, as it were"; and he recommends also that the roof should be so designed "that the top of the chamber should on no account be higher than the top of the arch"; for if a roof be not so constructed, he writes, "the tone is confined in the chamber too much, and instead of flowing out so as to be heard distinctly, there comes out of its prison a muffled tone, with neither body nor character."

It is also of importance that the under surface of the roof should be "even, and of such a smooth nature as would help the organ-tone, and answer the purpose of the old-fashioned sound-board (frequently found over pulpits)," and this surface Dr. Mann believes is best in the shape of a slope towards the opening, so as to "send the tone, as it were, into the church."

In addition to that portion of the organ which would be within the chamber, he would "in all cases (where possible) have either one and a half or two feet of the organ projecting beyond the main wall of the chancel," there being, he writes, "very few chancels which would not bear this two feet of organ projection"; and when the organ is next to the choir, he prefers to place the organist's seat under it; while if at the side of the sacristy, the modern system of pneumatic action enables the player to sit with the choir, and thus judge of the sound and tone of his instrument.

In concluding Dr. Mann's remarks I will add his suggestions about the practical, as well as ornamental, system of arranging the front pipes. He writes: "Organ-builders generally place on the outside of the organ (even when some of it is in the chancel) a row of the tallest pipes, such as open diapason, and so form a screen all round the exposed part. Now, on the contrary, I would open the organ front; for the fault of the old plan is to shut the tone in." He makes sketches of these two arrangements. In the latter he shows the pipes very short in the centre and rising on either side, so as to leave an open space. It would, no doubt, be possible to show within such an arrangement of front pipes a second range of pipes, as well as the ornamentally treated shutters of the "swell-box"—and, perhaps, to partially fill up the opening with tracery or scrollwork of wood, such as one sees in some fine ancient examples of the fifteenth and sixteenth centuries. Or, on the other hand, we might

LV. MUSICAL REQUIREMENTS IN CHURCH PLANNING (ix).



CHURCH OF THE KNIGHTS OF ST. JOHN AT VALLETTA, MALTA.

(See page 45.)



with great advantage in town churches adopt the Spanish shutter system, thus preserving the interior of the organ from harm through dust and dirt.

With Dr. Mann's views Mr. Redhead entirely agrees, and in expressing his conviction that the organ placed on the north or south side of the chancel is necessarily the best, he instances his own at the church of St. Mary Magdalene, Paddington. This organ, originally arranged from Street's designs, and constructed from Mr. Redhead's instructions, has been recently rebuilt in order to suit the pneumatic tubing which replaces the old lever movement. The organ-chamber is formed in the towers, and has arches opening both into the chancel and south transept; it is vaulted with brick, supported on stone groining ribs. Beneath the organ is the passage-way to the vestries in the crypt of the chancel, together with the side exit for communicants into the transept. The organist is seated under the arch-opening into the chancel, with his back to the choir; "the touch" is conveyed by pneumatic tubes taken under the floor and up the south wall of the tower to the wind-chests above, while the air is supplied from the bellows in the crypt below, and passes up by metal trunks placed against the screen. The bellows are worked by hydraulic power, and it may be useful to mention that the annual cost of the water is about £50, not a large sum when the constant use of this organ is taken into consideration.

With regard to the projection of the front of an organ, Mr. Redhead would have it "three clear feet from the chancel wall," and he entirely agrees with organ-builders in liking as much space as possible in and around the instrument, not only for sound, but for tuning and repairing; and he adds, "I do not myself object to a little boxing—in of the organ-pipes, for by this means we obtain what Mr. Belcher mentions in his 'valuable Paper and calls a 'sheltering of the tone.' I wish we had more of this lovely "sheltered tone in our churches, and less noise."

In churches which have chancel aisles, the organ may, of course, be well placed under the arch, on one or both sides. And if a pair be decided on, they should be so arranged in their construction, as they are at Westminster and at Seville, as not to interfere with the vista of the aisles. Sometimes the plan of an ancient church which has no aisles to the chancel may admit of the building of a chamber as a continuation of the aisle of the nave, retaining its east wall (against which was originally the chapel altar); then, by placing the front pipes in the window, instead of the glass, the tones of the organ may pass into the church through it, as well as through an opening in the chancel.

In the case of a cruciform church it is sometimes necessary to place the organ in the northern transept, though such a position is better avoided in order to preserve the transeptal effect of the building; but in a large church, where the transept is not too long, this position is often a good one—the grand organ of Barcelona Cathedral being an example of it, as are those of Chester Cathedral and Sherborne Abbey, where, in both, the unsightly effect of the blank wall against which the former monastic buildings abutted is got over with remarkably good effect, though there is the drawback that an organ so placed cannot easily be kept in time with the choir, which is

necessarily at some little distance from it. At Chichester Cathedral the organ is above the stalls under the northern arch of the crossing—a very effective position.

The plan of having two organs—one in the choir, and a larger one at the west end—may sometimes be very advantageous; and the case of Jesus College Chapel, Cambridge, is a remarkably successful example of this treatment. Here a new organ of large dimensions has been erected in the western gallery of the ante-chapel; while over the stalls, in one of the side arches of the choir, is retained that beautiful little organ designed by Mr. (afterwards Sir John) Sutton,* probably assisted by Pugin. This organ has the rare feature, for an English one, of painted shutters, such as one sees in Spain.

For the treatment of a great west-end organ, I cannot imagine any grander type than that of the glorious organ of Santa-Maria, at Lübeck; while that in the cathedral of Roeskilde (Denmark), with its projecting gallery and choir-organ, is a charming minor example of the always difficult triforium treatment—occupying the same relative position as the great organ of Chartres Cathedral.

The organ of Ely Cathedral, both in the arrangement of its pipes and in its richly designed case, is one of the best modern examples in England of this triforium treatment. The same position was adopted as early as the year 1842 at Canterbury Cathedral, when the pipes were placed, under William Hill's direction, in the triforium gallery of the choir. There is, however, no distinctive treatment of the fronts and case, as at Ely. When my father, in the year 1845, was preparing his report and designs for the restoration of St. Patrick's Cathedral, Dublin, he strongly recommended that the organs, after their removal from the rood-loft, should be set up in the triforium of the choir and north transept, as he shows them on his drawings. He had consulted Mr. Hill, amongst others experienced in such work; and in his reply Mr. Hill refers to the work he had done at Canterbury in these words:—"It has been found to answer perfectly, although the movement from the keys to the organ is upwards of eighty feet in length—the organist being seated in the choir, an arrangement which has been found to be extremely convenient." I may add that, during the Guinness restorations subsequently carried out (not under the direction of an architect), my father's plans were disregarded, and the organ was erected on the floor of the north choir aisle—completely filling up two or three of its bays.

Reverting to the suggested placing of the organ on the north side of the sacrum: at St. Andrew's, Wells Street, the organ with its keyboard is placed in a gallery at the east end of the north aisle of the chancel; at the old parish church of Brighton, and also at Kemerton Church, my father in rebuilding them constructed the organ-chamber over the vestry, with an arch opening into the sacrum; but the organist was perforce placed below in the vestry—an arrangement which it is now proposed, in the latter case, to modify by moving the keyboard to the south side near the stalls, connecting it with the organ by pneumatic tubing.

* The late Rev. F. H. Sutton, Hon. Canon of Lincoln, was well known not only as a distinguished amateur in art, but as a great authority and writer on ancient and modern organs.—R. H. C.

For college-chapels, large as well as small, I have found it best to construct a gallery over the ante-chapel, and to erect the organ in it either behind an arcade of three arches, or in one arch only, as the case may be. The keyboard is, I think, best placed at the side, and raised to such a height as will enable the organist to see and communicate with his choir, which is well situated in the centre in the case of a large chapel, or at the eastern end of a small one; the wooden floor and the flat boarded ceiling above are, I find, valuable as sounding-boards in throwing out the tone into the building. There is the advantage also of this position, that on special occasions the organ and the choir can be supplemented by other instruments and voices under the control of the organist.

In conclusion, I may add that it is satisfactory to learn that the opinion of Dr. Mann and Mr. Redhead, as two great authorities on the subject, is in general agreement with that of architects on the principles which should be observed both in planning a new church and in arranging an ancient one, for the organs to be well placed in them. It is to be hoped, therefore, that architects, and all who are concerned in the erection of organs, will work together, more than perhaps it has been their habit to do, and thus arrive as nearly as possible at the best solution of an always difficult problem.—R. HERBERT CARPENTER.

* * * The Discussion [see verbatim report in JOURNAL OF PROCEEDINGS, Vol. V., pp. 88-93] of Mr. Belcher's Paper was opened by Mr. H. H. Statham, whose revised Notes on the subject are printed at page 42 *ante*. It was continued by Mr. William White, F.S.A., Mr. C. Forster Hayward, F.S.A., Mr. Maurice B. Adams, Mr. Ralph Nevill, F.S.A., Mr. Edward J. Tarver, F.S.A., and Professor Aitchison, A.R.A. A brief abstract of their remarks, and of the reply made by the author of the Paper, is here appended:—

MR. WILLIAM WHITE, F.S.A., *Fellow*, agreed as to the necessity of two organs in large buildings, and thought that for the choir organ a position over the chancel screen was very good, provided it were kept sufficiently low and subordinate, so as not to interfere with the general effect of the building. As to placing the seat under the front of the organ, he had heard organists say they preferred it, for it gave them shelter from the great noise of the organ. In constructing an organ-case, his first desire was to learn from the organ-builder and the organist the manner in which they proposed the pipes should go, making such suggestions as seemed necessary. The architect, he considered, ought to ascertain the requirements and necessary construction, and then fit them to the purposes of the building.

MR. C. FORSTER HAYWARD, F.S.A., *Fellow*, felt that organs were often very much overdone, not only in the way organists used them, but also by being built too large for the buildings in which they were placed. With regard to organ-cases, one of the finest organs of modern times in a secular building was in the Speech Room at Harrow, designed by the late William Burges. This had no case whatever, and not one of the pipes was visible. The form of the building was that of a Greek theatre, the pipes being placed on the flat side behind the platform, which had its back against a screen, about five or six feet from the wall; that the screen was not against the wall was hardly noticeable, but the space between contained the instrument, and the keyboard was in front, immediately below the

front of the platform. The west-end position, two organs being used, he considered only suitable for cathedrals or large churches; and he instanced Amiens Cathedral as a notable example, in which the effects of alternating the performances, and then blending the music of the two, was something marvellous.

MR. MAURICE B. ADAMS, *Fellow*, said both Mr. Belcher and Mr. Statham had dealt with the question from a musical rather than a Churchman's point of view. The late Mr. Street had built several churches in which the question had been demonstrated in a most admirable and practical manner. St. Mary's, Paddington, was an example in which the choir organ answered also for voluntaries, and was available for the æsthetical part of the service. The organ could be overdone, but in St. Mary's, he thought, the happy medium, the practical medium, had been arrived at, and that Mr. Street had hit upon it as nicely and conveniently, as well as architecturally, as could well be devised. In St. Augustine's, Kilburn, designed by Mr. Pearson, was an admirable arrangement for locating the organ. It was in a sort of triforium gallery, with a projecting bay, which made a most exquisite feature architecturally; and it was in every way most satisfactory. Mr. Belcher's plan seemed to him in many ways admirable from a ritual point of view, but it could only apply to a rather large church.

MR. RALPH NEVILL, F.S.A., *Fellow*, thought one of the most important practical points elicited by the Paper was that of placing the organ at the east end, behind the altar, which would be an excellent place for it as regarded sound; and he saw no reason why the west face of the organ should not be treated as one of those large and high reredoses of which there were many instances in modern churches. He agreed with Mr. Belcher that a certain amount of compression was very desirable to give full value to the volume of sound which came from an instrument, and that would be obtained in such a position. Apart from the ritual question, there was no doubt that the western gallery was the finest place of all for the organ and the choir.

MR. EDWARD J. TARVER, F.S.A., *Fellow*, referred to one point in Mr. Belcher's plan not previously alluded to: that the organ was placed on the north side by choice, because organ-players believed that to be the best position with regard to equal temperature. In the church of the Miracoli, at Brescia, the difficulty of disposing of the bellows had been most satisfactorily met, being made into one of the most ornamental features of the west front.

PROFESSOR AITCHISON, A.R.A., *Member of Council*, had a vivid recollection of the exquisite music he had heard from the organ at Haarlem, which was in the west end. Organ-cases were, as a rule, not very beautiful, and mostly showed more ingenuity than taste; that at Santa-Maria-della-Scala, Siena, which was given in Hill's book on organs, had, however, great merit. Bands playing the "tuba," or long trumpet, from Roman times downwards, had always made one of the most beautiful groups in *bas-reliefs*. He thought the Spaniards were the only people who had attempted to reproduce that effect with organ-pipes; at Seville Cathedral some of them were set out just as the trumpets were, and, although an organ-pipe was not to be compared for beauty of shape with a trumpet, still, as far as could be, the effect was obtained.

MR. JOHN BELCHER, *Fellow*, in his reply, considered that Mr. Statham, who was well known as an accomplished organist, had spoken from an organist's point of view; he himself looked at the question from that of the architect. For ordinary purposes, where the choir was seated in the chancel, the western organ alone was impossible; he had been considering the best position for an organ in a church of average dimensions, where it would hardly be wise to provide two organs. In a cathedral he would certainly attempt that arrangement, but then the difficulty of the organist manipulating both organs from the chancel would be, he thought, very great. The organ at Amiens was a very fine one, but was too near the roof. The Haarlem organ was one that had the advantage of being spread out. An organ of large size did not necessarily mean great volume of sound, as the stops were not all used together, and ought to be employed discreetly, to obtain variety. An organ required plenty of room, in order that there might be easy access to every part of it, and the necessary space for the pipes to speak in.

LVI.

PICTURESQUENESS IN REFERENCE TO ARCHITECTURE.

By Sir RICHARD TEMPLE, Bart., G.C.S.I., M.P.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

I PROCEED to deliver my promised address on the application of picturesque principles to architecture, Indian and other. Before an audience of experts I shall not attempt to deal with technicalities, but shall confine myself to general principles with reference to art and artistic effect. I start with the assumption that true and real architecture must be beautiful as well as useful. As regards utility, there does not seem to be much need of remark from me—indeed there is no danger of this branch of the subject failing to receive a due share of attention in the present age. Moreover, the same genius that wins beauty for architecture will secure utility simultaneously. The masterpieces of art to which I shall call attention are equally signalised by constructive ingenuity. It is rather to the other branch—namely, beauty—that I invite your judicious consideration this evening. In modern times there is fear lest, while the condition of man is mightily advanced and many of his powers and faculties are wondrously developed, some of his finer qualities should become cramped and subdued. In the works of imaginative genius, for instance, he does not seem to advance—rather the reverse. In poetry, in pictorial art, in literary composition, our century has difficulty in surpassing the preceding centuries. Perhaps the architectural authorities of to-day may fear lest the same remark should apply to architecture. Are the structures of these days as beautiful as those of the Middle Ages? Some are; others, perhaps, are not. Have we that superiority in beauty which we ought to have, considering the advance in our science, our experience, our education? Probably not. In former ages the master-architects, in my opinion, were artists first, then architects, then engineers. This, I suppose, is the order and sequence of thought which raised up the architects who designed structures of extraordinary beauty. Perhaps the same

order is still preserved. But certainly there is danger, in an age of utilitarian enterprise like ours, lest the process should be reversed, and lest the designer should be an engineer first, then an architect, and lastly an artist. In such a case there would be a risk lest the artistic part of the education should be swamped by the other parts, and lest the designer should never become an artist at all, or at the best an artist only in a secondary degree. At all events, my assumption is that a master-architect, designing structures that are to last for ages as national monuments, has ever been and must be, *inter alia*, an artist, imbued fundamentally with artistic principles and ideas. On this assumption my remarks will be based.

In the first place, what is to be the test of true beauty in a structure? Several answers might be given to this question. I submit for your consideration that the best answer is in this wise. If a structure, exterior or interior, can be, from an artistic point of view, sketched or painted—with due regard to pictorial effect—then it is certainly beautiful. If, on the other hand, it fails to fulfil this test, then its claims to beauty must be challenged. If, as is probably the case with many a structure in all times and climes, it partly succeeds and partly fails according to this standard, then its claims to beauty should be adjudged for allowance in some respects and disallowance in others.

If this axiom be admitted, then one of the first, perhaps the very first duty of a young student, or aspirant for architectural fame, is to study the "Laws of Composition," just as painters and sculptors study them, in the artistically-technical sense of the terms. By "composition" I mean the arrangement of the several parts of a structure just as if it were a picture, the determination of the chief object, the subordination of all other points thereto; the relation of the secondary objects to the primary object in the view; the principal light and the principal shadow; the concentration of effect; the massing of details in contrast with flat surfaces; the combination of a certain variety with a certain uniformity; and other matters which I need not labour here. There will even be the effect of foreground, middle-distance, and background in a structure, as in a picture.

Under this general consideration there will be certain principles which I would summarise, with special regard to beauty in architecture.

In the first place, there must be grandeur of effect, if the structure be a large one. This cannot be if the general shape shall be found to have a clumsy sameness. Therefore, variety of feature must be introduced into the shape. But among those features there must be at least a prominent and predominating one, visible from afar, marked in character so that he who runs may read its meaning and be struck thereby. There may be other decided features as well, but they must be subordinate to this one. To this, as to every rule, there may be exceptions. For instance, mere magnitude of itself confers grandeur. At Cairo there are certain old mosques which every artist delights to sketch—so they must be acknowledged to be picturesque, and to that extent beautiful. Nevertheless, if their shape comes to be criticised, they are little more than gigantic pepper-boxes. Their noble dimensions, with several points of detail and other adven-

titious circumstances, render them beautiful notwithstanding. But we do gather this lesson—that, in architecture at least, magnitude is essential to grandeur.

Subsidiary to this, in the second place, there should be such arrangements that the principal lights and the principal shadows in the whole structure shall be concentrated round this leading feature. To that end there must be careful consideration as to how the light shall be caught and the shadows shall fall during the earlier and the later hours of the day.

In the third place, there must be character in every part of the structure. There is not, of course, any one kind of character to be universally commended, but rather countless kinds, each of which has its merits. Take the analogy of scenery. There is a character of the flat champaign—as that of the steppe—which has its beauty; there is a character of the jagged peaks and the rugged surface, of the long waving lines by some called the curves of beauty, and so on. Of any of these things we can make much, each in its way. But we often come to scenery that is interminably undulating, literally like the waves of the sea, neither flat, nor rugged, nor gently waving—so that it really is nothing particular—and of such we can make nothing pictorially. So it will be with architecture in any given structure *mutatis mutandis*. And the same principle will apply to details as well as general design. There is one kind of beauty in curved lines, and another kind in angularities, but sometimes we see the two so mixed together that the beauty of both is lost. Take an instance thus. An ordinary house in Amsterdam is full of great windows, till it is almost like a glass-house; the brickwork of the wall is entirely subordinated to the windows. There is in this a character of window; so several of such houses taken together, with some combination of canal, of foliage, and of sky, have much of picturesque beauty. Again, in many Spanish houses the effect is wholly that of wall: one or two little windows being introduced here and there just to break the monotony. Here, then, the effect is not of window, but of wall—and this, pictorially, may be capital in its way. But in many structures in different parts of the world we see windows so scattered about that there is no effect at all, neither of wall nor of window—and this is artistically bad. The perfect apportionment of windows and balconies to wall-space was one of the glories of Venetian architecture.

In the fourth place, there should often be a variety or diversification in the design, subject always to a certain guiding uniformity—according to which principle there would be no two parts quite alike—no two ends or extremities quite the same, and so on—diverse features being made to balance one another on the whole effect. We all know that many of our stateliest piles owe their picturesqueness mainly to this arrangement. In detail, much of the Chinese and Japanese decorative work derives its charm from this method, the *minutiae* of the pattern being carefully diversified in subjection always to a general uniformity, so that there is a systematic character; yet the eye never tires, but is ever amused, by gazing at the changeful combinations. I have said advisedly that this should often be the case, because it is not so universally. This method was, as a rule, not adopted by the ancient Greeks; it is not often found in the

Indian buildings presently to be criticised, and it is wholly dispensed with in the supremely beautiful structure which I shall mention hereafter as the loveliest ever built on earth.

In the fifth place, there must be a due sense of proportion—of height to length and breadth, and so on—throughout the design. The rule of proportion is so indescribably subtle that it can be felt rather than described. The result, for good or for evil, is most perceptible when the design is simple. If the sense of proportion be well preserved, then the simplest design will probably be more effective than the most elaborate. Simplicity and majesty are largely to be found in the Capitol at Washington, for instance. That happy result is doubtless due in part to the sense of proportion pervading the design. It is hard, indeed, to explain beforehand how that proportion shall be sought for which tends to beauty—and how seldom is that attained ! Often it is marred by the designs coming under different eyes and hands during the course of long protracted operations, or by the fact of the architect being overruled owing to extraneous circumstances—as, for instance, at St. Peter's in Rome, where the prince of artist-architects was obliged to raise the façade out of proportion to the whole building, so that the dome cannot be seen from the front view, on the ground at least.

In the sixth place, colour, both in exterior and interior, should be attained in combination with form, wherever that may be possible. I say deliberately, wherever possible—because that must greatly depend on available material, on atmosphere and on climatic conditions. These advantages are seldom possessed by us in our Northern latitudes, as regards the exterior of buildings, whereas they fortunately abound in the sunny lands to which I am about to advert. On the other hand, by means of glass we introduce the most resplendent hues into our interiors, which, in Eastern countries, is never done. I shall show, however, that the Orientals obtained colour often for their exteriors, and sometimes for their interiors, by an art which we never possessed, but which they have for some generations lost apparently beyond recovery.

In the seventh place, it may be said that the style should be suited to the country, its sky, its vegetation, its scenery, and so on. I, for one, am not sure, however, whether this is really a principle. Certainly, white marble cannot be satisfactorily used for exteriors, beyond certain latitudes, or at least beyond certain climatic zones. But, save in a very few cases of this nature, surely a beautiful thing in form, or material, or design, can be naturalised in any country under Heaven ! They say that the finest styles in architecture were suggested originally by natural surroundings. Yes ; but it by no means follows therefrom that the style looks well only in those surroundings. The Athenian architecture was imagined and thought out in Attic scenery. Still it looks well at the Walhalla, on the bank of the Upper Danube ; at the Royal Exchange in London, and at many other places. The Gothic style was similarly suggested by the Teutonic peoples. Still it looks well in Spain ; and now it lifts the minds of men heavenwards, on the plains of British India as much as anywhere else. But, certainly, every part of a structure should be adapted to some particular use or purpose, and the

adaptation should be clearly perceptible to the spectator. This is always the case in the East, but not so invariably in the West.

Lastly, in the eighth place, there should be a directing and governing idea, of some definite sort, in the mind of the architect, which finds expression not only in the main part, but in the subordinate parts also, down even to the minutest detail. This is, indeed, hard of attainment, though it has actually been attained in many Eastern structures.

Now, I shall not attempt to elaborate these principles before an audience of experts such as this. Perhaps they may be thought at first sight to be matters of course. But are they so really? Though they generally command observance, yet have they not been repeatedly violated or overlooked, wholly or partly, in many ages and in many countries? At all events, I now propose, with your permission, to try and test, by these canons, the several styles which have prevailed in an area of the very first interest and importance architecturally, namely, British India.

Now, in modern times Hindoo architecture has been, and still is, very busy. The style has its beauties, of course, but is wanting in several of the qualities indicated in the canons I have ventured to set forth. First, the civil structures—chiefly palaces—are deficient in feature and in character. They are really fortress-dwellings, and defensibility governs their plan. Their expanse of finely-cut stone-wall, though simple and imposing, can hardly be called a feature; but it is generally broken by graceful balconies judiciously placed, and it is often surmounted by rows of pretty little cupolas as finials. The balconies lend a charm to most Oriental mansions. In none is this adornment more marked than in the modern Hindoo structures.

The wonderful wells, known as Bâolis, have not exactly an architectural style; for all that, they are works of amazing beauty. These wells are of vast breadth—square, not round—with noble flights of steps leading down to them—with bridges across them and corridors surrounding them—so as to suit the rise and fall of the water. They are reservoirs in thirsty lands, to save men from drought. Their style is ornamented but sparingly, is grand and severe, as befits their serious purpose. When their noble stonework is stained with age, and interspersed with the foliage which in Eastern climes is apt to mingle with masonry, they become picturesque in a high degree, and so answer most of our tests.

There are two palaces which I must particularise—one in the south, the other in the north of India; in respect of date they are both what we should call mediæval. The southern, at Madura,* is a mighty pile, and, to some extent, has a grand or imposing effect. But otherwise it does not seem to me to answer our tests. Its style is nondescript: not, indeed, wanting in character, but having several characters unwisely mixed. It has been partially repaired, for public purposes, by the British Government, and that is well; otherwise, it is one of those buildings which look

* See TRANSACTIONS, 1875-76, page 159, for a description (with illustrations) of "Tirocmal Naik's Palace, "Madura," by Mr. R. F. Chisholm, *Fellow*, formerly Consulting Architect to the Government of Madras, and now of Baroda.

better in ruin than after reparation. The northern, at Deeg, near Bhurtpore, is a palatial summer-house. Its size being large, it is not wanting in grandeur. But its purpose is tasteful ornamentation, gracefully refined. In that respect, it is, I suppose, unsurpassed on earth. It answers each and all of our tests to perfection. The finish of detail within the boldness of outline; the chiaroscuro produced by the shadows from the projecting eaves; the arrangement of arched windows and doorways; the exquisitely projecting balconies; the balanced proportion between the whole and the parts; the combination of straight lines, curves, and angles; the adaptation of the stone material to climatic surroundings—render it quite a study in the art of producing beauty. A school of architectural design could not do better than send out a class of students to note and mark this structure. It is so superior in its particular way to anything else among the Hindoos, that we may believe that it borrowed some of its ideas from the Mohammedans. For all that, it is Hindoo, and the Mohammedans have never themselves produced such a gem of this particular kind.

But modern Hindoo architecture is chiefly distinguished by its temples. Their characteristic, in comparison with other times, is smallness, throughout Northern and Central India. They are, therefore, wholly wanting in grandeur or imposing effect. Their surface is overlaid with minute ornamentation in carved stone. They have no interiors worth mentioning. With all these drawbacks they possess one feature which has a decided character, and is capable of being developed into one of the finest features to be found in the architecture of the world, and that is the "Shiwāla." I know not how to designate the Shiwāla technically. But I will explain briefly what it is, and perhaps you will apply the proper designation. It is something between a spire and a cone. Its tapering top looks like a pinnacle of which the point has been cut off square. Then its sides slightly bulge out with a gentle curvature. Thus it rises in a somewhat slender form, and swells slightly in rising, but terminates abruptly before reaching to a point. But on the top there will be a finial of importance, emblematical of sacred things. If its rounded sides were flat, its beauty would be lessened. But these are usually diversified in some marked manner; often they are ribbed, vertically or horizontally, so as to catch lights and shadows. And this variety of surface is in keeping with the general shape, whenever the material is stone, as it generally is. Thus constituted, the Shiwāla has beauty and simplicity, though its dimensions be insignificant; but its beauty grows with size. It looks particularly well in groups of various sizes, especially at the head of long flights of steps leading up from the water's edge. Probably the best specimen of such a group is that on the high bank of the Ganges at Benares. The group, although its members are individually small, yet has much of grace, dignity, and repose. The form, too, accords with the scenery, whether the structure be embosomed in a grove, or perched on a rocky height, or cresting a ridge, or charmingly reflected in the water of a sacred tank.

In Southern India the Shiwāla gains greatly in size, but loses in simplicity by reason of ornamentation unsuited to the shape. But these temples have enclosures,

and each enclosure has at least two gateways, called "Goparums." The style of these "Goparums" is very bold in outline: in the main square, very broad at the base, but diminishing towards the lofty top. But, though the stone structure is solid, it is not thick, but rather thin, in comparison with its height and breadth. As a consequence of all this, it is somewhat ugly when seen, so to speak, in full face, but becomes very picturesque when seen in side-face—that is, in perspective. This picturesqueness, too, is almost always enhanced by surroundings—if inside a city, by quaint dwellings round about; if outside a city, by foliage and water. Then, within this plain and simple outline, there is a mass of superficial ornamentation, carvings of sacred figures innumerable. Had these fine carvings been artistically arranged, the general effect might have been magnificent. As they actually are, however, the effect is grotesque, and serves to prove that ornamentation, however fine in detail, must be judiciously grouped and arranged so as to produce the right effect. In this case the architects were thinking more of the Hindoo mythology than of artistic design.

Before leaving the modern Hindoos, I must say a word about the architecture of Nepal, in the Eastern Himalayas. This remarkable style is founded on the Chinese Pagoda principle, which is, doubtless, familiar to you. But the adaptation is in a semi-barbaric fashion. The lovely curvature and the ineffable grace of the Chinese structures are lost. There is a wondrous combination of features—enamelled brickwork, ornamental tile-work, vigorous wood-carving, copper-roofing, the copper being often gilt, but when not gilt assuming exquisite hues from atmospheric action. The outcome might be superb were the operations directed by the eye and hand of Culture. In fact, it indicates the national disposition of the Nepalese; they are vigorous and strong-minded, with a sufficient sense of grandeur to desire to imitate the Chinese, but not enough sense to imitate and adapt truly—consequently the imitation is clumsy. And, though amidst their matchless surroundings in the heart of the Himalayas, with a glorious background of everlasting snow, these Nepalese structures may be seen under a picturesque aspect, still their style is worthy of an architect's notice, if only to show how the noblest details may be wasted artistically, if the guiding, the pervading idea be defective.

A word also must be said regarding the Mahratta architecture, which is wholly modern. Its character is dominated by the material, namely, teak-wood. It is hard, if not impossible, for a merely wooden structure to attain magnitude. Still these Mahratta structures, with their graceful pillars, their arches, their vaulted roofs, their projecting eaves, their elaborate carving, were highly artistic, though the general effect was too much of darkness unrelieved. I say *were*, for, alas! within even my memory, two of the finest examples, the palaces at Poona and Nagpore, have been destroyed by fire.

Passing, then, from what must be called this degenerate age of Indian architecture, I look back on the heroic period of the antique Aryans in India, fit indeed to stimulate the imagination of a cultured posterity! No complete specimen survives. The ravages of time, the earthquakes, the hand of the iconoclast, have done their worst. Still some most noble fragments remain. Of these I shall select five for mention—

namely, the Black Pagoda of Orissa; the redstone ruin at Bindrabun, near Agra; the greystone ruin at Islamabad, in Cashmere; the sister Shiwâlas of Jagannath and Bhuvaneshwar, also in Orissa; and the Shiwâla of Booddh Gya in Behar.

The temple at Booddh Gya is the finest example in ruin of the conception which gave birth to the Shiwâla form. It is an exterior only, with no appreciable interior. It was built of grand brickwork; it may have been faced with ribbed stone; if so, the facing has been lost. But, defaced and disfigured and bereft of its finial, it still towers

up majestically as one of the very queens of architecture. Its form gently tapering from a broad base, its shapely sides, its soaring altitude, still greet our eyes. In its desolation it still indicates proportions which proclaim it a finer work in its pristine completion than most of our European towers, than the Giralda at Seville, the Campanile at Venice, the Watch-tower at Cracow, the Ivan Velik at Moscow, the Seraskier at Constantinople. By antiquarians it may be claimed as belonging to Booddhism. But its informing spirit is Hindoo, or Aryan. And after all, in the north of India, its birthplace, Booddhism was only a reformation of Brahmanism, or Hindooism proper. In Cashmere there is also one gem, at Pandrenton, a little temple in the midst of a tank fed by unfailing springs. This has so much quaintness, originality, and structural

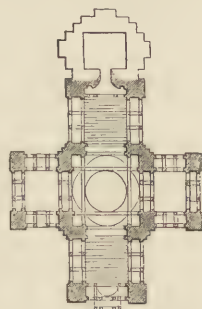


THE SHIWÂLA OF BOODDH GYA.

skill, that it has been the theme of more antiquarian and professional comment than any other building in the East. In these antique works I do not suppose that the architects had artistic culture at all as the architects of the buildings we shall presently consider. They were consumed by a passionate sentiment for their mythological faith, their all-pervading pantheism; they were spurred on by pride of race. Thus moved, they let their imaginations guide their eye and hand, without giving much thought to rules or canons of design.

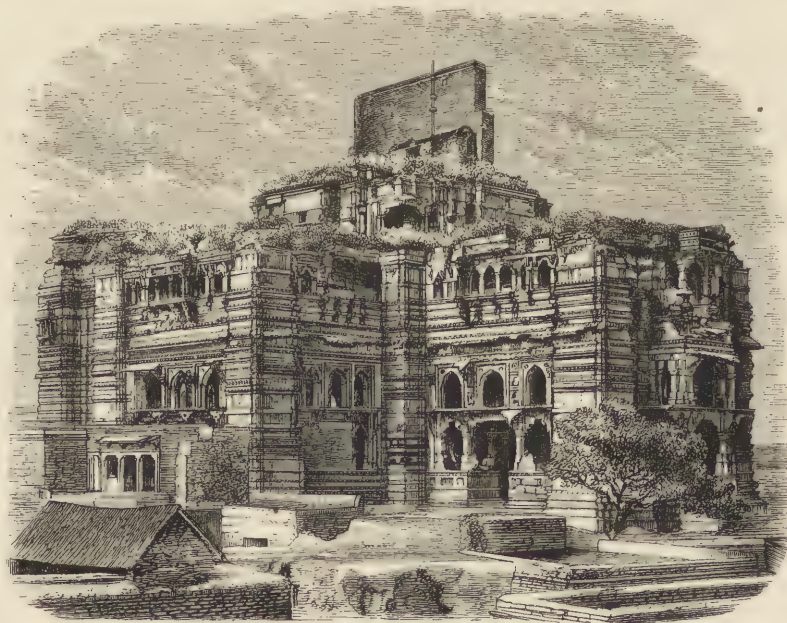
The Black Pagoda stands near "the sad sea-waves," an embodiment of everlasting sadness. Its name was given to it by our sailors because it is a landmark to those

at sea. We behold it only in its maimed condition. It must originally have had some towering superstructure—probably of the Shiwāla shape—which subsided some centuries ago, and is now an undistinguishable mound of débris. The portion still standing is little more than the vestibule, but even that is among the largest of ruins anywhere. The outline is of the boldest and simplest kind. The exterior surface is adorned with carvings of sacred figures excellently arranged for general effect. Nothing can exceed the expressiveness, the freedom, the boldness of these greystone sculptures. There is no interior that can now be described; it is mostly blocked up with fallen rubbish. There probably never was an interior of any noticeable character. The redstone ruin at Bindrabun is quite otherwise. The structure has lost its outline, and we cannot now judge what that must have been. But that, doubtless, accorded in splendour with the interior. Happily, enough of the interior is preserved for us to study and admire the style, the lofty proportions, the arched roof, the colonnades, the carved figures, the grand doorways, the splendid play of light and shade, and everything that makes up architectural beauty, in form and chiaroscuro. Added to this is the all-pervading colour,



PLAN OF TEMPLE AT
BINDRABUN.*

100 ft. to 1 in.

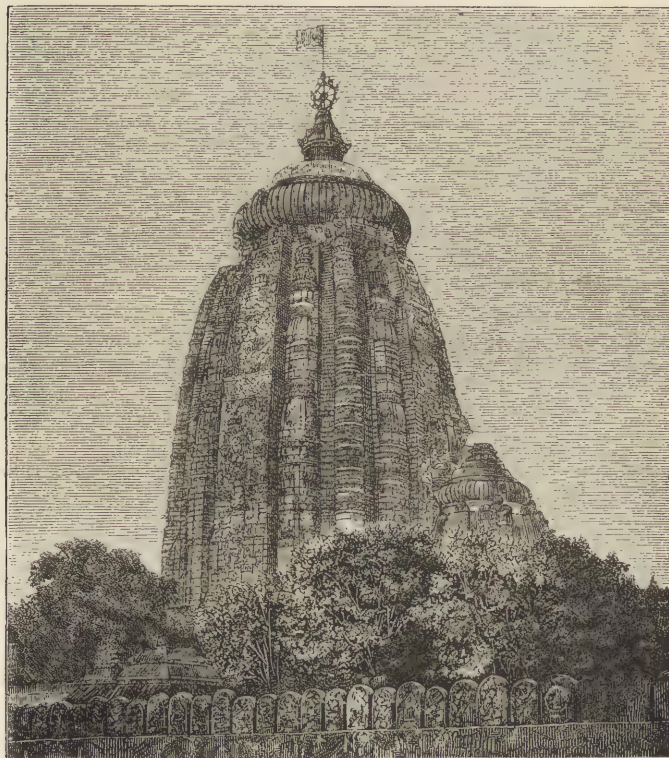


RED SANDSTONE TEMPLE AT BINDRABUN.*

the deep red of the stone sombred, but not subdued by time. I know not whether it still is as it was when I sketched it more than thirty years ago. If it be, then it is the finest ruined interior that I have ever seen or heard of; and it is, I believe, the

* See [JOURNAL OF PROCEEDINGS, Vol. V., p. 313] Fergusson's remarks, written in 1838, upon this extraordinary temple, which consists of nave, transepts, and chancel.

only Hindoo interior of the first rank now remaining to us. It may have had subsidiary buildings in its enclosure, but, if it had, they are lost. Its surrounding scenery is not remarkable. The greystone ruin in Cashmere, on the other hand, has



SHIWĀLA OF THE TEMPLE AT JAGANNATH (PURI).
(Reduced from *Indian and Eastern Architecture*.)

not only the central temple, but also a vast enclosure, surrounded by monastic cells and cloisters, and having several great gateways. Its surrounding scenery is the finest possible, being the peerless valley of Cashmere, environed by everlasting snow. The style is that of archaic simplicity and herculean boldness. The design is comprehensive, and evidently was worked out on one main thought. Its mighty sides compacted with limestone blocks support a lofty roof, of which some of the quaintly shaped arches still remain. The sculpture of the sacred figures is in

bas-relief, aiding, but not interfering with, the general effect. There must have been some towering superstructure of which the shape can be only conjectured. The interior must have been grand as the exterior, but is too much blocked up to be properly perceptible.

The sister Shiwālas of Jagannath (the famous pilgrimage place) and Bhuvaneshwar in Orissa are the finest structures of their class, still occupied and used for temple-service. Their character is generally that already described; their sides, vestibules, and gateways showing the boldest flights of decoration. They have a circular, rose-like finial, which on festive occasions is lighted up. I witnessed once such illumination, which, indeed, emphasised the architectural design superbly.

I shall not attempt to dilate on that wondrous class of works known as "the rock-cut temples" of India. The style of these glorious caves, though dominated by the necessities of excavation, has many grand features worthy of an architect's attention. I shall cite only one case—namely, that of the Kailas Temple at Ellora—presenting the strange spectacle of a great temple first hewn solidly, *en bloc*, out of the trap-rock hill-

side, which mighty block was then excavated inside, to form the interior. My reason for citing it is this, that it affords the only large case, in my knowledge, of a Hindoo temple entirely cased over with bright colours. The Mohammedan iconoclasts tried to deface, and actually to burn, the colours away ! But much of the beautiful colouring-matter still remains. This method of ornamentation must doubtless have been employed in many other cases, of which we have lost the trace.

Passing to another branch of my great subject, I must advert to the Booddhist architecture of British India only. One notable case, that of Booddh Gya, which might be claimed for this category, I have already noticed. I do not at all dwell upon the class of structures so famous under the name of Tope, because the architectural portions are really lost. The celebrated Bhilsa gateway—of which you all know the model—has no particular style that could be adduced. But, as seen *in situ* in its native habitat, it is perhaps the most picturesque gateway in existence.

I will select for brief notice four Booddhist examples—namely, the Cave of Karli, near Bombay; the Monastery at Pamionchi in Sikkim, of the Eastern Himalayas; the Pagodas at Rangoon and Prome in Burma.

The Karli Cave, as an interior, though too angular in style for beauty perhaps, is nevertheless to be studied for the dignity and simplicity of its ribbed roof. The capitals of its pillars, consisting of groups of elephants, are the finest capitals I ever saw.

The Pamionchi Monastery is wonderful for

its roof, spreading like a vast umbrella above the whole structure, with overshadowing eaves. This roofing consists of bamboo stems, thickly compacted together to sustain



SHIWALA OF THE TEMPLE AT BHUVANESHWAR.

(Reduced from *Indian and Eastern Architecture*.)

the weight of the long winter's snow. For structural skill, in utilising available material for climatic necessities, it is a model to students.

The masonry pagodas of Rangoon and Prome, being for the most part cased with copper and gilded towards the culminating point, were doubtless meant to shoot up under the sunshine like obelisks of flame into the sky. The pagoda at Rangoon, with its big, swelling base, rounded in the main, but with its great circumference diversified by various curves, then with its beautiful stem gracefully tapering to a sublime height, with exquisite gradations, represents artistic curvature in the highest refinement. It reigns alone on its elevated platform without any surroundings of wood, and is all the better for the solitude. The Prome Pagoda, on the other hand—similar in style, though not quite so fine—has such surroundings. The approach to its platform is by a carved wooden staircase, over which there is an arched roofing, surmounted by pinnacles. The pagoda, then, is seen rising in gilded splendour from amidst a forest of wooden pinnacles. The effect is what it was meant to be—splendid. Perhaps the contrast may be thought by some to be too strong, and verging on the semi-barbaric. Still, as a contrast, there are few architectural efforts of greater boldness than this.

I may observe here that the Booddhist architecture supplies innumerable instances of grand staircases,* which are generally wanting in the Hindoo and Mohammedan architecture.

I now arrive at the Mohammedan style, the culminating point of architecture—in India certainly, and perhaps in the world. So many varieties are there in this wondrous style, that for me to describe them in this address would be as if any one were to expound the whole range of Gothic architecture for all Europe. I can only select the most salient features in reference to the artistic principles which we have been following.

The growth of this matchless style continued for five centuries, till it reached a climax in the seventeenth century, in the time of the sovereigns popularly known by the name of "The Great Moghul"—about the time of our Stuart kings. Before the Moghul era it was stiff and formal, sometimes even awkward. Still, it had boldness of character and originality of genius. Like all architecture of sterling merit, it was markedly adapted to particular uses, and bore signal traces of the adaptation. It is replete with architectural gems of every sort, which are too numerous for me even to mention here. Some of its results—such as the Palace and the Tomb of Akbar the Great near Agra, the Mosques at Ahmedabad near Bombay, the collection of domed Tombs at Golconda in the Deccan, and other structures—would have been models, as

* One of these grand staircases is indicated in the sketch of the Temple of Jagannath, at Oodeypore [Illustrn. xii.], by Mr. William Simpson, R.I., *Hon. Associate*, who has also been kind enough to lend for reproduction his sketches of the two celebrated towers at the neighbouring city of Chittore [Illustrns. xiii. and xiv.], as examples of picturesqueness in architecture. It may, moreover, be noted that the illustrations in the text of this Paper (excepting the two on pages 68 and 69) are from those published in Fergusson's *Indian and Eastern Architecture*, 8vo. Murray, Lond. 1876, and, except where otherwise stated, are from electrotypes of the same presented by Mr. John Murray, F.S.A., *Hon. Associate*.





TEMPLE OF JAGANNATH, AT
FROM A SKETCH MADE IN 1861 BY W

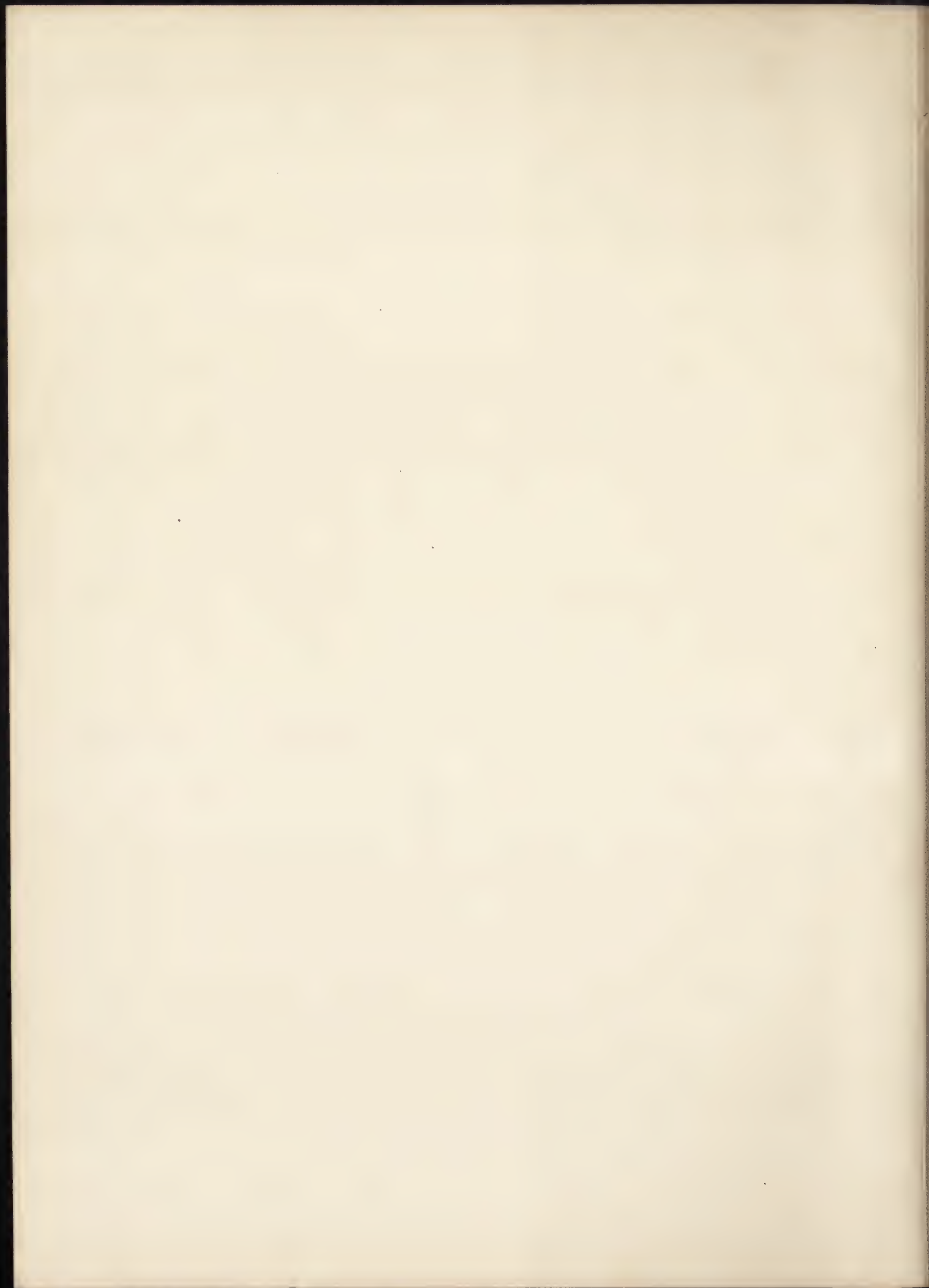
WELL, PHOTO. THE P. & O. N. V. & CO. LONDON

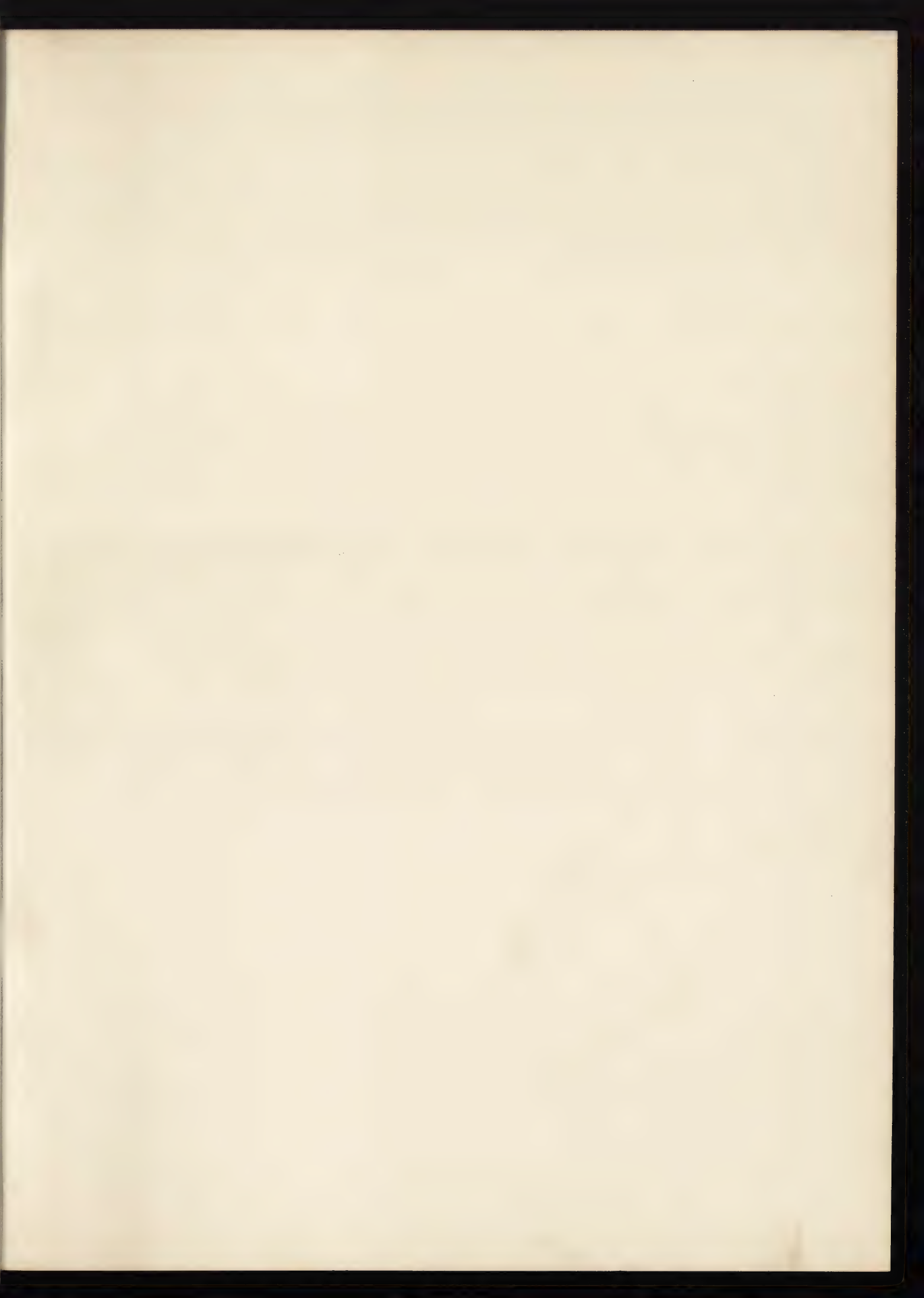
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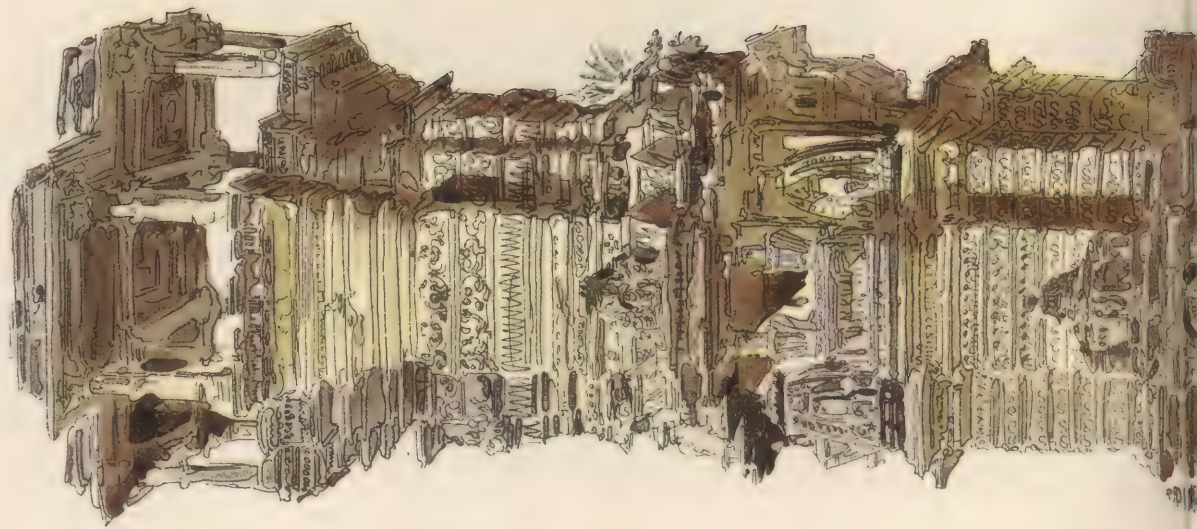
OODEYPORE, RAJPOOTANA.

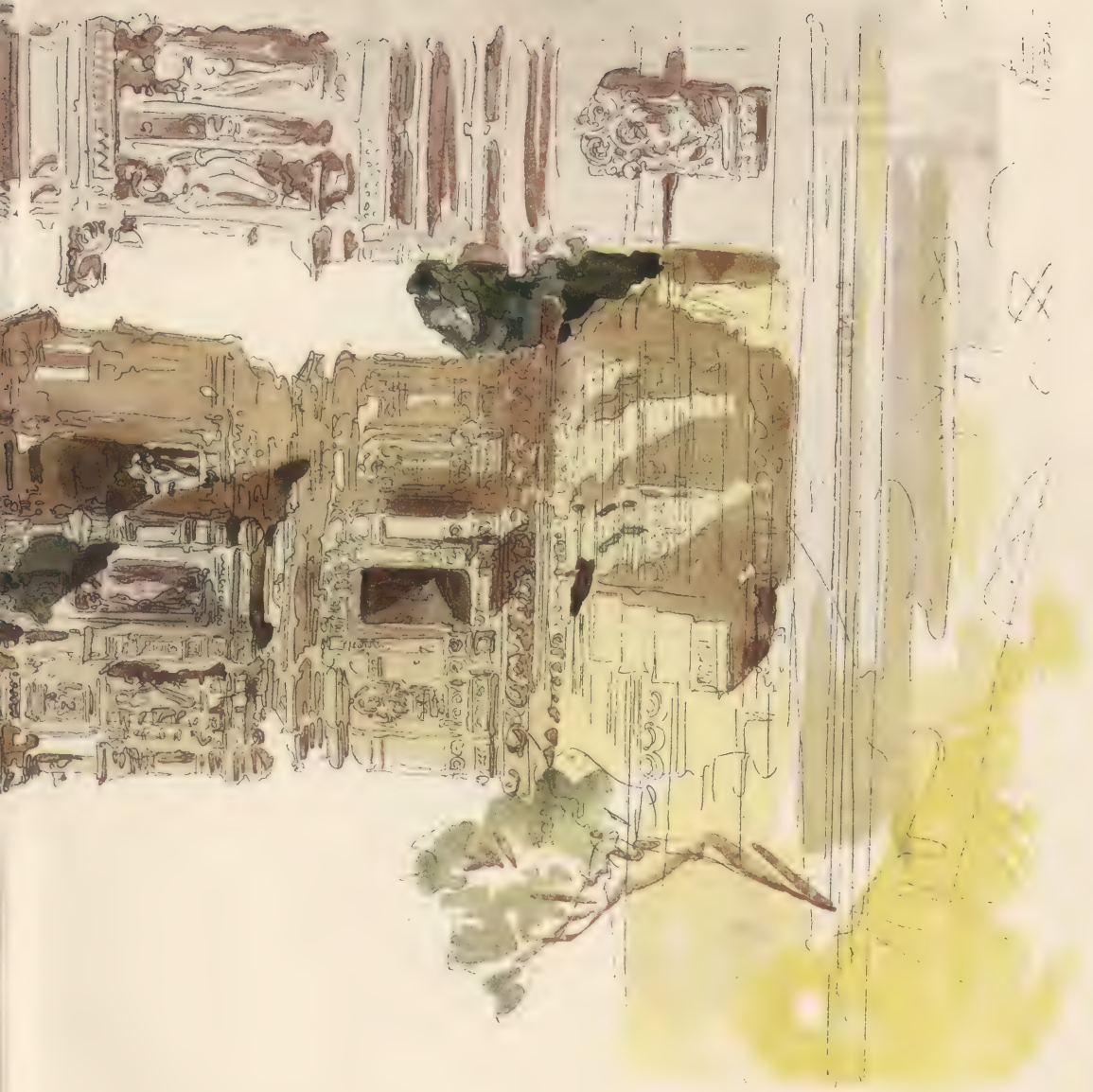
LIAM SIMPSON, R.I., HON. ASSOCIATE.





TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. V. NEW SERIES.
LVI. PICTURESQUENESS IN REFERENCE TO ARCHITECTURE (xiii.)





JAINA TOWER AT CHITTORE, RAJPOOTANA (CIRCA NINTH CENTURY).

See page 100, for a description of the tower and its surroundings. Also see page 101, for a description of the tower and its surroundings.

See page 100, for a description of the tower and its surroundings. Also see page 101, for a description of the tower and its surroundings.





TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS. VOL. V, NEW SERIES.
LVI. PICTURESQUENESS IN REFERENCE TO ARCHITECTURE. (xiv)





TOWER OF VICTORY, AT CHITTORE, RAJPOOTANA. [15TH CENTURY, A.D.]

FROM A SKETCH, MADE IN 1861. BY WILLIAM SIMPSON, R.I. HON. ASSOCIATE.

See Page 64.



they certainly are wonders, for future ages, had they not been conquered by the victorious beauty of that which came afterwards. Still, it produced two works which, in their way, have never been equalled, which I must briefly mention—namely, the Kootub Tower at Delhi, and the great dome of Beejapore in the Deccan.

The Kootub is a perfect example of rigid simplicity of form, relieved only by detail of marked consistency. It is something like a gigantic obelisk of mighty altitude, with a grandly broad base, narrowing gradually towards the top, but not exactly tapering. The details consist merely of ribbed stonework and circular balconies at intervals. The ribbing is so bold and marked as to catch light and shadow, and it follows the main outline—that is, it is narrow towards the top and broadens towards the base.

The dome of Beejapore is of majestic proportions, swelling intensely, as if with imperial pride, towards its broad base. It has been repeatedly measured and examined, and is justly pronounced to be the finest ever yet erected—superior to the domes of the Cathedral at Florence, of St. Peter's at Rome, of St. Paul's in London. The structural skill evinced in its erection has been the wonder of professional men during subsequent generations.

It must be remembered that while the carved and sculptured decorations in the Hindoo architecture comprised the human form in every guise, and many sacred animals also, the Mohammedan artists were obliged to discard all these things as profane, and as savouring of idolatry. Nevertheless, though deprived of these resources, which have been so helpful to the architects of all other times and climes, the Mohammedans of this earlier period had much, very much of carved decorations, but the forms were derived from inanimate nature—flowers, and the like.

I must now hasten to the peerless examples of the Moghul period; and I will select the chiefest—namely, the Imperial Mosques at Lahore and Delhi, the Pearl Mosques at Delhi and Agra, and lastly the Taj Mehâl at Agra.

The general form of these four mosques at Lahore, Delhi, and Agra may be set forth thus. Imagine a great quadrangle, with an arcade all round, with a fountain in the midst, and with a lofty minaret at each of the four corners; at one side of the quadrangle an open structure with three or more great arches, and corresponding with the arches at least three noble cupolas over the roof, and at the opposite side a grand gateway. Inside the structure, underneath a grandly arched roof, and on smooth stone slabs, the worshippers stand or kneel. I have only to add that up to the great gateway there leads a flight of steps of great breadth. This very simple description explains the plan of four among the most celebrated structures in existence anywhere, and of many lesser, though still beautiful, structures built in their style. Manifestly, simplicity and symmetry are their governing ideas. There is absolutely no element of variety or variation in them as defined in our canons. Consequently, they are not quite so picturesque, do not lend themselves quite so much to pictorial effect, as one might have expected. And it is impossible to get the whole structure on a canvas, or within one plane of vision. But parts of them taken in perspective deserve as much

the study of the painter as of the architect. They are, indeed, all consummately beautiful; but I will touch first on the two Imperial Mosques, and secondly on the two Pearl Mosques.

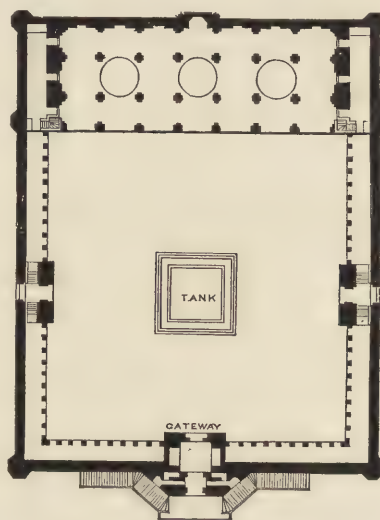
The Imperial Mosque at Lahore was the first executed on a great scale in its special style, and the speciality is in this wise. A beautiful contrast of colour pervading the whole structure is obtained by the use of material, white marble and red sandstone, in a climate where the preservation of comparatively pure colour in the open air is possible for several centuries. There are a few climates in the world where this is possible, and the climate of North-Western India is one of them. The realisation of this cardinal circumstance was due to the genius of the Moghul architects. In the Lahore Mosque the contrast is the simplest—too simple, indeed, as we shall presently see. In general terms, the exterior of the structure is of the redstone entirely, or almost entirely; while the cupolas are of white marble. Thus, on the whole, the white is all in one part and the red all in another. Each is of itself so beautiful, that the want of combination of colours would hardly have been noticed had not this want been felt and supplied in the Mosque at Delhi afterwards. The interior is of light stones, with some variations in hue and tint. The arches are broad, with noble curvature, like the very best of our Gothic arches; not rounded at the top, but moderately pointed, broad at the base, without any of the Saracenic or the "horse-shoe" character. The great white marble domes gleaming against the azure sky have a splendid speciality in shape. They are pointed at the top, but they do not, like most domes elsewhere, gradually curve outwards with regularity, broadening to the base. Their sides swell and swell to the middle, and then slightly diminish, coming gently inwards towards the base. Thus they have an ineffable refinement in shape. The snowy breast of the swan reflected on a lake, the bellying white sail of the caïque in the Levant, never swelled more gracefully than these domes. There are a few lesser cupolas of the same style, one on the top of each of the minarets, and four or six on the gateway. The roof of the arcades on the sides is mostly straight and horizontal. There is hardly any surface decoration anywhere.

The outline of the Imperial Mosque at Delhi is the same in style, but considerably grander in dimensions. But the beneficent change consists in this, that white marble is introduced amidst the redstone, carrying the effect of the domè colour into the body of the structure. The lines of white are further accentuated by some lines of darker stone. This is done sparingly and with amazing skill. I shall not attempt to describe the indescribable beauty of the combination. Suffice it to say, that the combination of colour united with superb form renders this the queen mosque of the Mohammedan world. I suppose that, regarding Taste in the highest sense, this is the most tasteful structure ever erected for the worship of the Deity in any land. The Moghul architects felt that their faith in the One God had superseded a multiform and many-headed heathenism; oneness, majestic unity, made up their idea which they strove to embody in their work. The embodiment too was effected with a masterly confidence never surpassed by their profession in any age. They had thought out

their plan beforehand from beginning to end as the best conceivable for their sacred purpose, and they departed not a hair's breadth in execution [Illustrn. xv.].

Both these mosques went through many vicissitudes of war and revolution; for some time they came under the care of the British Government, but for many years past they have been restored to the Mohammedans, and are both in use and in perfect preservation.

The two Pearl Mosques are of the same design and plan as the two Imperial Mosques above described. The difference is that they are built entirely of white marble; hence their name of Pearl. The one at Delhi, inside the Imperial Palace, is somewhat small, being designed for the Emperor and his family only. It is regarded as the gem of the Mohammedan world. The one inside the fortress of Agra is much larger, being designed for the Emperor and his court. It might be apprehended that the white of the marble would prove monotonous. But no; there is a sort of subdued warmth in the colouring of the marble—a superb display of chiaroscuro, breadth of light and of shadow—a marvellous play of reflected half-lights inside the broad shadow, that causes a changeless variety at all hours of the day, and prevents the gaze from ever tiring. But doubtless the artist-architects reckoned on the sky above to help them. And so it does. For full two-thirds, almost three-quarters, of every year any view that can be taken of these exquisite structures consists, half of the unsearchable depths of the ethereal azure, and the other half of marble under a chameleon-like variety of glaring brightness, half light, reflected, and delicate shadow. The spectator feels as if in a romantic solitude with the sky and the marble. Both these mosques are scrupulously preserved by the British Government as among the monuments of the Empire.

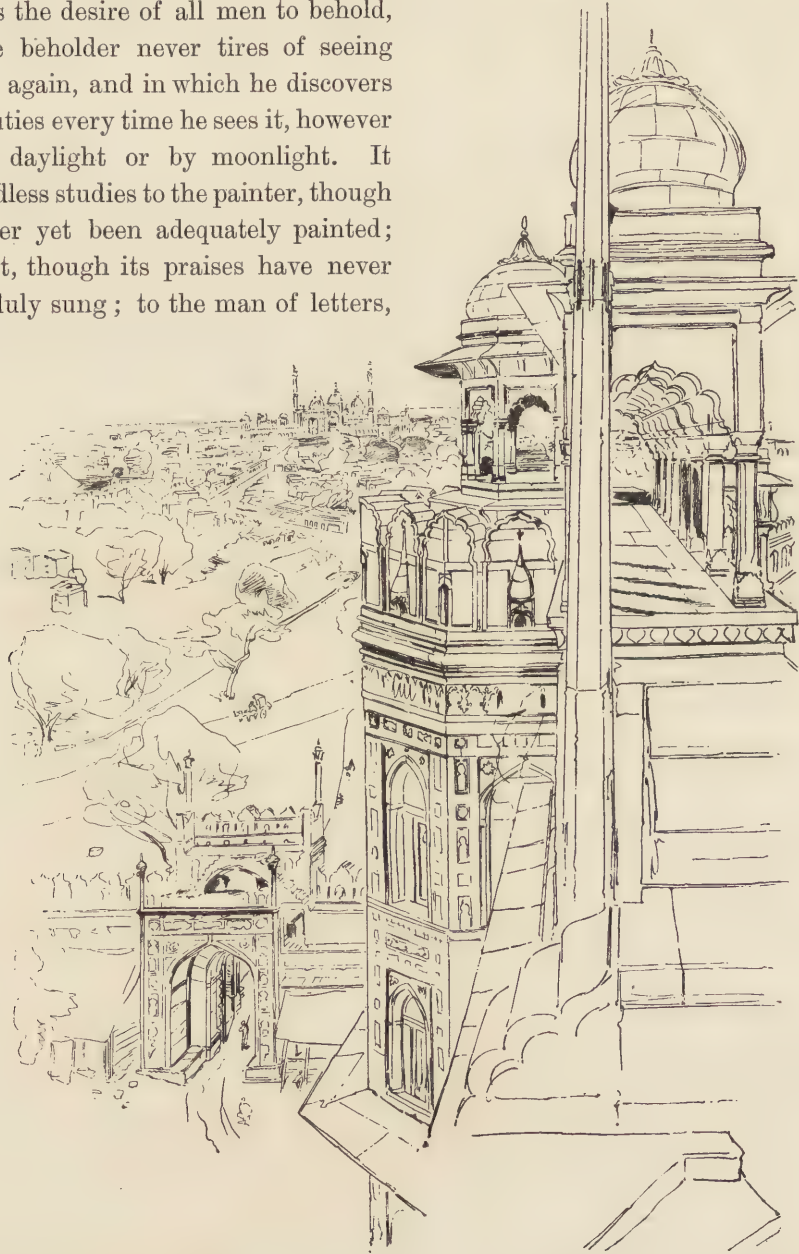


PLAN OF THE PEARL MOSQUE, AGRA.
100 ft. to 1 in.

I now come to the climax of the Moghul style in the Taj Mehâl,* near Agra, the name being a corruption of the title of the Empress whose mausoleum it is. Now pray imagine a plateau on the right bank of the Jumna; the flank overhanging the river is magnificently revetted; the opposite side is occupied by a cypress grove; the two other sides are marked each by a mosque built in the same style and with the same red and white stone as the Imperial Mosque at Delhi, only much smaller, as they are meant to be quite subsidiary to the central structure; and near the four corners are minarets entirely of white marble. Lastly, in the midst there rises up a

* See TRANSACTIONS, 1869-70, pp. 195-202, for a description of the Taj Mehâl, by Mr. W. Emerson *Member of Council*, with illustrations of the marble screen in the interior of the building. See also footnote on page 76 for a reference to Sleeman's description of it.

mighty octagon, with a great dome, all of marble; the sides of the octagon are slightly diversified with inlaid stones, but the dome is of marble, the purest and the simplest. Such, in the briefest terms, is the structure which it is the desire of all men to behold, which the beholder never tires of seeing again and again, and in which he discovers fresh beauties every time he sees it, however often, by daylight or by moonlight. It affords endless studies to the painter, though it has never yet been adequately painted; to the poet, though its praises have never yet been duly sung; to the man of letters,



VIEW FROM THE FORT OF AGRA IN 1862. From a sketch by Mr. William Simpson, R.I., *Hon. Associate.*

though it has never yet been fully set forth by word-painting. In the first place, there is the contrast between the pearly white of the marble and the azure sky; there are many component parts of the splendid total, but all these parts are in perfect sub-



THE TAJ MEHÂL AT AGRA, FROM THE GARDEN.

(Reproduced from a photograph.)

ordination to the central object, the octagonal shrine ; there are several domes and many cupolas, serving as satellites or ministers to the monarch dome over the octagon. Probably in no building ever erected has the combination of parts into an harmonious whole, and the subordination of subsidiary objects to the supreme object, been so perfectly

attained as in this. But the ineffable, the unapproached if not the unapproachable charm in the whole design is the sense of proportion. Every thoughtful observer who wishes to discover why he is delighted feels at once the pervading proportion as if it were magic. But the charm, though intensely felt, cannot be described; nor can the rule be propounded. Here is the example, follow that. But the following must be exact. Other structures have been built in supposed imitation; but for some reason or other there will be some departures from the governing proportions of the original, and in the copy the beauty is either lessened or lost. Again, nowhere else is such perfect symmetry absolutely mapped out beforehand and severely pursued to the very end. And over the whole style reign the goddesses of simplicity, refinement, and chasteness.

Manifestly this unmatched effort of architecture fulfils to perfection some of the canons which we have been following, but is quite outside others of them.

The effect of this building (as of all other Mohammedan structures) was intended to be in the exterior only. There is "dark interior"—grand and fine, of course, but not suited for daylight, and meant, no doubt, for the repose and seclusion of the Imperial dead. Further, as a proof that the Moghuls were artists perhaps before they were architects, the landscape surroundings of this structure may be considered. From the plain on the opposite side of the river the dome shines forth like the moon in a cloudless heaven. From the other side the grove and the cypress avenue set forth with the richest gloom the brilliancy of the marble [Illustn. xvi.]* This monument is perfectly preserved by the British Government as the chief jewel of our Eastern dominion.

In the several structures described above, colour is obtained naturally from the stone materials. But in some other structures colour is obtained artificially by an art now lost for the most part. By that art colours of the greatest depth and brilliancy and also of the most refined quality were imparted to and fixed on earth of the most enduring character. The most gorgeous instance of this is supplied by the mosque at Lahore called the "Wuzeeri." Still more remarkable cases are seen in Sindh, where concave interiors of domed tombs and shrines are covered with every hue of violet, emerald, and azure. So brilliant and yet so harmonious is the colouring, that the place seems ablaze with colour. These, too, are among the few instances to be seen of exteriors being lighted and arranged for beauty—in a land where the artist-architects devoted themselves mainly to the exteriors.

Finally, it is instructive to note the luckless contrast afforded by the architecture which succeeded that of the Moghuls. This utter bathos is to be seen chiefly in the pretentious structures at Lucknow. There, despite all the elaboration, the characteristics of the grand æra, the artistic boldness, the sweep of the stately curvature, the combination of curve and angle, the sense of proportion between the vertical and

* An idea of the deep colours of foliage and flowers in which the Taj is set, so to speak, may be obtained from an examination of Miss North's paintings of Indian scenery, in the remarkable gallery and collection she has presented to the nation at Kew Gardens.

horizontal are lost. The student will thus learn how short the step often is from the sublime to the commonplace, and how subtle is the border-line between the poetic and the prosaic.

I have thus applied our tests and canons to the principal cases of Hindoo, Buddhist, and Mohammedan architecture in British India—that is, to cases which few of you can have had an opportunity of seeing. I will, in conclusion, cite cursorily a few cases nearer home, in Europe, which you will have seen, in order that you may judge of the manner in which our canons would be applied to the West as well as to the East.

Consider the inspiration which moved the architects of the Taj Mehâl at Agra—in what instances is a like spirit to be perceived in Europe? Well, I should say it is perceptible throughout the noble and exquisite interior of the chapel of the Escorial near Madrid, in what would presumably be termed the finest type of the Renaissance style. Among Gothic structures, it is perceptible in the interior of Cologne Cathedral. At Granada the Moorish Alhambra is beautiful, according to all our tests. But it has an additional beauty seldom or never seen in India; namely, the entire diversification of the surface not only with colour, but with superficial variations, some details gently protruding, some receding. Thus there is a delicate play of light and shade modifying the colours from hour to hour. This speciality is apparently due to a particular kind of lime found in the Sierra Nevada. But in close neighbourhood to this most artistic architecture is the Spanish Cathedral—where Ferdinand and Isabella are interred—very ugly on the whole, and offending against many of our canons. The most tasteless effort in Europe perhaps is the great chapel at Mafra, near Lisbon, where, owing to the use of a peculiar marble, brown and white, the effect of infinite labour is lost as regards beauty, the result being little short of hideous confusion. The interiors of many churches and chapels of the Russo-Greek Church are gorgeous, and in certain aspects may be considered picturesque. But the gorgeousness is often marred by defective arrangement of the rich materials. The interior of St. Sophia at Constantinople is regarded by many as one of the finest interiors in existence. For all that, its picturesqueness may be doubted. There is perhaps some defect in the proportions; and certainly the light falls in too scattered a manner. The vestibule, however, is the noblest thing of its class I ever saw. The European region where the mediæval architecture will probably be found to answer most of our tests, is the north-west of France, including Normandy and Brittany.

Still nearer home it may be remarked that either our architects arranged the designs of cathedrals to suit the English landscape, or that succeeding generations have modified the landscape to suit the architecture. The loveliest instance is that of Salisbury Spire springing up close to lofty trees. In the Metropolis, I submit, with deference to your better judgment, that the Palace of Westminster, including all the Parliamentary buildings, does answer all, or very nearly all, of our canons. It has guiding ideas, unity of design, variety with a general uniformity, simplicity of outline, multiplicity of strictly ordered detail, prominence of central objects and subordination of other objects to them. However unapproachable in beauty the interior of Westminster

Abbey may be, I suppose that its exterior outline is not nearly so fine in design as the modern Palace adjoining; and the two towers at the end are deficient in grandeur. Still, the Abbey is a noble addition to the national group. If we cast our glance from the clock-tower of the House of Commons, past Westminster Hall on to the Victoria Tower, then by St. Margaret's to the end of Westminster Abbey, we see a group embodying British architecture old and new—the like of which is hardly to be found in any country. We have two halls, one at Westminster and one in the new Law Courts, both fine; which would you consider the finest? Perhaps you would give the palm to Westminster Hall; if so, the cause would be discerned in this, that Westminster Hall is the more perfect in proportion. Doubtless the architects under the Norman kings, with the open spaces then existing at Westminster, had a freer hand than the architects of to-day near Temple Bar. I suppose that the churches, including St. Paul's Cathedral, built under Sir Christopher Wren's direction, fulfil most of our canons; and they have an originality as well as individuality. But in reference to our canons, the question suggests itself, whether the dome of St. Paul's swells enough, or is sufficiently large for the structure it surmounts; probably not. In our dwellings London affords cardinal instances of the value of variety. In some of our older streets, no two houses are alike; each house taken simply may be plain and unattractive; but the whole line of them, taken in combination, is picturesque solely on account of the endless variation. Recent instances of variety are in some of the newly-built avenues, where each detached house is handsome and all the houses are various. Consequently these are among the most artistic additions that have been made to modern London, and are in happy contrast to the miles of monotony to be seen in the streets of South Kensington. The frontage of the Natural History Museum is absolutely symmetrical, and in perspective, as I have seen it under a sunset sky, is most picturesque. The architect may derive encouragement from the Moghul examples, which are supremely picturesque and yet are severely symmetrical, though they have other beauties arising from the subtlest causes. Possibly if some of the Oriental architects of antiquity could revisit the earth they would consider the architecture of modern Europe to be somewhat formal. However, I do not presume to criticise this architecture in detail. I merely adduce a few salient instances in order that you may see how the canons which we have been pursuing together will work in practice among familiar cases.

And now to conclude. My address may be termed æsthetic. Be it so; for all that, it is practical too. For in the Eastern works we have been considering together the highest ideality of the artist was married to consummate skill in the builder's craft. My meaning is to familiarise the student with the virtues and glories of Oriental art, not with a view to servile imitation of them, but in order that, being imbued with their ideas, he may catch fresh inspiration for himself, and strike out paths of original invention. Again, my object is to inspire you with the proudest notions of architecture as a profession. It seems to me that for this purpose Britons have, among other qualities, these four, namely, poetic insight, a love of Nature, mechanical skill, struc-



EXTERIOR AND INTERIOR OF THE IMPERIAL MOSQUE AT DELHI, FROM PHOTOGRAPHS.

See pages 66, 67, and 74.





THE TAJ MEHÁL AT AGRA, FROM A PHOTOGRAPH.
See page 70.



tural aptitude. The four qualities ought to make great architects. Thus I trust that England will continue to hold as high a relative position in architecture as she has held in many other branches of human effort; and that the architects of to-day will raise structures that our posterity from the Greater Britain beyond the Ocean will come here to see as the national monuments in this the original home of the English-speaking race.

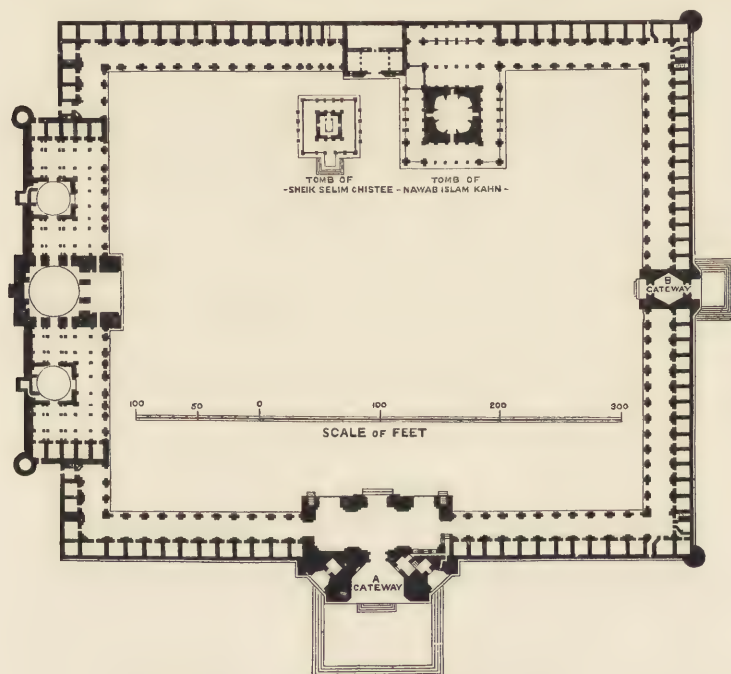
RICHARD TEMPLE.

[Notes by R. PHENÉ SPIERS, F.S.A., *Member of Council.*]

I have never been in India—never nearer to it than Egypt—but I can appreciate, to a certain extent, the feelings which have inspired Sir Richard Temple's address, and I can bear witness to the extreme difficulty of presenting the subject intelligibly to those who have never seen the buildings, many of them beautiful, and all interesting, which he has described. Last year I read a Paper on Saracenic architecture before the Architectural Association, and I treated the subject more in detail in the *JOURNAL OF PROCEEDINGS* * under the heading of "Stalactite (Honeycomb) Vaulting," showing by illustrations how in my opinion the stalactite vault and pendentive peculiar to the Eastern countries originated. It had been my intention to devote myself exclusively to the buildings I had seen in Egypt, Syria, and Constantinople, but I found myself impelled towards the Mohammedan styles of India, where I was literally swamped in their extraordinary variety and magnificence. The late Mr. Fergusson, in his *Indian and Eastern Architecture*, discriminates between thirteen divisions of the Indo-Saracenic style alone; and when I came to analyse these I found that each one was enriched with such a number of buildings of extraordinary size and magnificence, illustrating the thirteen divisions, that it was impossible to grasp them all, or to bring them within the compass of a Paper. Perhaps I am more impressed with the styles preceding those of the period which Sir Richard has most eulogised; and I know that architects who have visited the North-West of India have been more struck with the originality apparent in the works of Akbar at Futtehpore Sikri, and with the simple grandeur of the ruined buildings in the neighbourhood of Delhi, than with the more delicate productions of the Moghul period at Agra. Take for instance the magnificent gateway to the great mosque of Futtehpore Sikri; and I do not think that Sir Richard, though he minutely described the traditional form and arrangement of an Indian mosque, laid sufficient stress upon that one great feature which Hindoo architects, working for their Mohammedan masters, brought to such perfection—namely, the magnificent porches giving access to the inclosure, often on three of its sides, as at Delhi, but on only two sides in the great mosque to which I wish to direct attention [see plan and view]. The gateway A [page 75] seems to me to be far finer as a composition

* See *JOURNAL OF PROCEEDINGS*, Vol. IV., pp. 256 and 282.

than the gateways to the Imperial Mosque at Delhi [Illustn. xv.]. Its skyline of kiosks, which form much more important features, is most beautiful; and it has what is of great value, a series of small arcades beneath the side arches and running round the internal half octagon which give size to the central archway, and "scale" to the whole. In that central archway the features show further subdivisions, and the eye grasps first the door, then the arcade, then other features, and ultimately, though gradually, begins to realise the stupendous size of the archway which includes them all. I should like to quote here the words used by Fergusson in describing this gateway, which measures 130 feet by 85 feet in plan. "As it stands," he writes, "on a rising ground, when looked at from below its appearance is noble beyond that of any



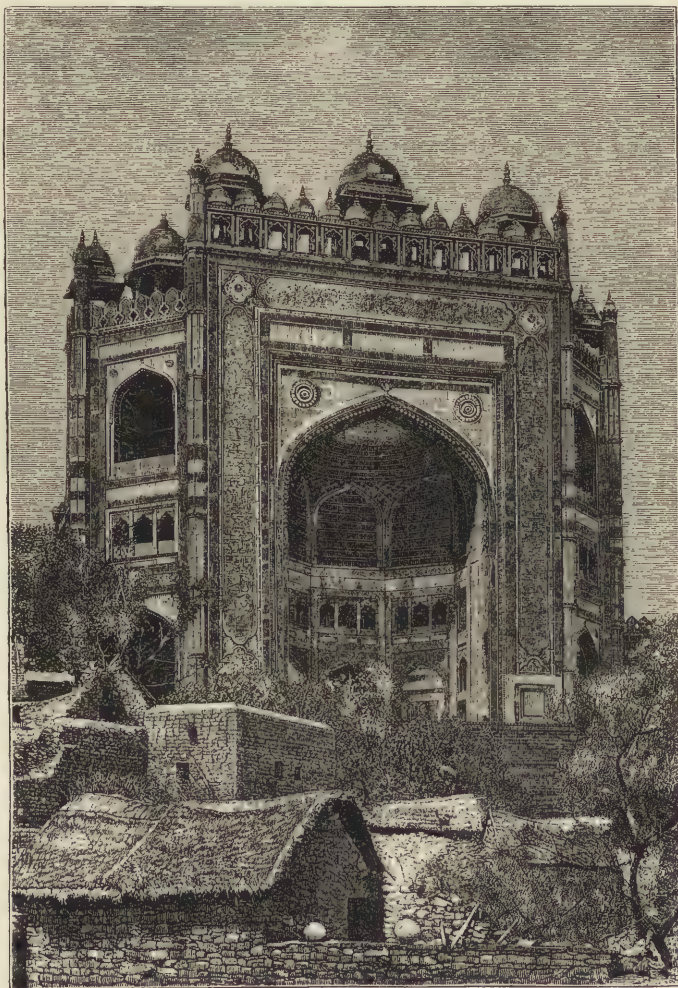
PLAN OF THE GREAT MOSQUE AT FUTTEHPORE SIKRI.

"portal attached to
"any mosque in
"India, perhaps in
"the whole world.
"This gateway may
"also be quoted as a
"perfectly satisfac-
"tory solution of a
"problem which has
"exercised the inge-
"nuity of architects
"in all ages, but was
"more successfully
"treated by the Sa-
"racenic architects
"than any others. It
"was always manifest
"that to give a large
"building a door at
"all in proportion to
"its dimensions was,

"to say the least of it, very inconvenient. Men are only six feet high, and they do
"not want portals through which elephants might march. The Greeks never
"ventured, however, to reduce the proportionate size of their portals, though it
"may be they only opened the lower half, and they covered them, in almost all
"instances, with porticos to give them a dignity that even their dimensions failed
"to impart. The Gothic architects tried, by splaying their deeply embowed doorways,
"and by ornamenting them richly with carving and sculpture, to give them the
"dignity that was indispensable for their situation, without unnecessarily increasing
"the size of the openings. It was left, however, for the Saracenic architects com-
"pletely to get over the difficulty. They placed their portals—one, three, or five, of
"very moderate dimensions—at the back of a semi-dome. This last feature thus

“ became the porch or portico, and its dimensions became those of the portal, wholly
 “ irrespective of the size of the opening. No one, for instance, looking at this gateway
 “ can mistake that it is a doorway and that only, and no one thinks of the size of the
 “ openings which are provided at its base. The semi-dome is the modulus of the
 “ design, and its scale that by which the imagination measures its magnificence.”

The late Mr. Fergusson, and others equally well known to most of us, often treated the subject of the celebrated Dome of Beejapore, to which Sir Richard has also alluded in his Paper. The question of the theory of the thrust of its ribs has been a prolific subject of comment among us, and it struck me, on reconsidering the matter during my studies of Saracenic vaulting, to which I have alluded, that whenever nations of artists get hold of some new theory of construction, and work it out, they take the lead in the locality and at the period in which they appear, and make an extraordinary advance. The architects of Beejapore, having found out this new method of resisting the thrust of the ribs, seem to have taken



GREAT GATEWAY (A) OF THE MOSQUE AT FUTTEHPORE SIKRI.

(Reduced from *Indian and Eastern Architecture*.)

a sudden leap, and to have become imbued with a new feeling for design. The work of this Dome, and of the mosque immediately adjoining it, shows the influence of the new idea, a new principle which the architects had just acquired, and which they developed. In making these notes I have no intention or desire to attempt any depreciation of the value as works of art of the Moghul buildings which Sir Richard has described in glowing terms. I have looked carefully through the numerous and

beautiful drawings, the work of his own hands, which he has been kind enough to lend to illustrate the buildings, and I have no difficulty in understanding the feelings which prompt him to admire them. It may also be in the recollection of others besides myself that about two years ago at the Grosvenor Gallery there was an exhibition of paintings by that remarkable Russian artist, Verestchagin, and among them were two views of the Pearl Mosque in the Fort of Agra [see p. 67 *ante*]. Those who saw them may have realised the truth of Sir Richard's description when he referred to the value of the deep azure sky behind the soft modified tones of the white marble, as well as the general effect of beauty in this Pearl Mosque.—R. PHENÉ SPIERS.

In the Discussion [see verbatim report in JOURNAL OF PROCEEDINGS, Vol. V., pp. 144–47] of Sir Richard Temple's Paper, Mr. Spiers, whose revised notes are given above, took part. The President, General Maclagan, R.E., and Mr. Arthur Cates joined in the same, and a brief abstract of their remarks is here appended:—

MR. ALFRED WATERHOUSE, R.A., *President*, felt sure that architects would feel flattered that the art which had evoked the sympathy and admiration of such a man as Sir Richard Temple should be their own art—a man who had spent his life in administering and governing vast provinces in India, and who notwithstanding had found time to make innumerable drawings of the buildings of that great Empire, and to evolve conclusions of his own as to the principles which should govern design in architecture. Sir Richard had, moreover, called attention afresh to the fact that an architect should be, before all else, an artist.

GENERAL MACLAGAN, R.E., believed that the noble works which had been described found a response in the hearts of the people generally—a belief in which he was supported by the fact, that in the towns, and even the villages, at least of North India, native taste was displayed in the carvings of doors and balconies, and on the boats plying on the rivers. The skill shown in choosing sites for notable buildings was also very remarkable, as, for instance, in the Hindoo temples, with a grand background of richly-wooded hills and lofty cliffs, or commanding a fine outlook on beautiful valleys. India, he added, was now visited by English travellers of every description, and it was a field on which architects would find much to interest and instruct them.

MR. ARTHUR CATES, *Vice-President*, agreed with the President that it was matter of congratulation to find a man so distinguished as Sir Richard Temple treating the subject of Indian architecture, and in a masterly fashion; he agreed also with General Maclagan that members of the Institute and students who had been in the habit of going to Greece and Rome might well take advantage of the present facilities to visit India, and report on some of the notable buildings to be found in almost every part of it—buildings which had grown out of the necessities of the climate, and the study of which, though their charm depended largely upon what might be called aerial effects, would supply a basis of principles to be used by students of architecture in their own designs in accordance with the necessities and exigencies of the country and climate in which they lived.

SIR RICHARD TEMPLE, in his reply, gave a short description of some of his water-colour drawings of the buildings to which he had referred in the Paper; and in allusion to the history of the Taj Mehâl, stated that the true story of the design of the Taj was to be found in Sleeman's *Rambles and Recollections of an Indian Official*,* the work of a great traveller and distinguished officer who had all official information respecting it at his disposal.

* This work in two volumes by the late Colonel W. H. Sleeman was published in 1844. Chapter III. (vol. ii.), which is devoted to Agra and its buildings, is most interesting, at least to architects, and the illustrations, which are in colour, are excellent. Chapter VI. (vol. ii.) contains a view of the gateway at Futtehpore Sikri [see preceding page], in which the colour of the red sandstone is admirably portrayed.

LVII.

SPECIFICATION-WRITING.*

By THOMAS M. RICKMAN, F.S.A., *Associate*.Mr. Arthur Cates, *Vice-President*, in the Chair.

MR. VICE-PRESIDENT AND GENTLEMEN,—

THE Specification is one of the means employed by the architect to carry his design into execution. The design is in his mind. The drawings present a reproduction of the design in scale projection; they are a representation of the idea in the architect's mind. The specification is the translation of the design into technical language, describing the selection of the materials, and the construction of the whole.

As our ideas of outward objects are derived from their effects on our senses, and increase in number as our senses are developed, and are in many cases the reflex action of curiosity on our part; so the working-up of a specification is, in the architect's mind, partly the result of past thought, but specially the result of that most valuable characteristic of the human mind, active curiosity.

The necessity of exactly describing the execution of a design in technical language, according to that notion of completeness which corresponds to the individual equation, is at the bottom of all specification writing, and is perhaps the most effective educational incentive in professional practice. The representation of a design by drawings assumes all the preliminary stages of execution; the drawings belong to a different sphere of thought from the specification, for the latter goes through all the preliminary steps in detail. This deals with the execution of the work; those with the completed structure. The drawings belong to the material world; the specification requires an atmosphere of technical language—each is a special phase of ideography.

The specification assumes knowledge common to the architect and the builder, and it must be written in terms which are intelligible and unmistakable.

* The author wishes it to be known that this Paper was written at the instance of the Literature Standing Committee of the Institute.

There are three forms of expression into which the writers of specifications fall, which may be indicated in this wise :—(1) The form of instructions to the workmen of an employer—in which case the items may properly be said *to be* ; (2) The form of instructions to a builder, working by contract, where the contractor is instructed *to do* ; (3) The third form is where an existing building is to be altered—in which case the form of phrase adopted unfortunately comes to this, that the building is *to suffer*. Perhaps these three forms of expression refer to the ideas of the thing to be done, the mode of doing it, and the object to be obtained by the work : each of which will be present in the mind of the writer, as of greater importance at different times, according to the bent of his mind.

The architect's view being to carry out his design, the specification is prepared by him for that end. The client's view of a specification is, that it should tell him what he is to have for his money, and to enable him to get it. The builder's view is to know from the specification what he has to do to enable him to obtain his payment.

The measuring surveyor also has his view of a specification—namely, after he has from the study of the drawings and the instructions of the architect transferred the design from the architect's mind to his own, and constructed it on paper in the form of dimensions, to see that the specification really conveys a correct impression, and can convey no incorrect impression, of the work as he understands it.

The client and builder are both to be bound by the plain meaning of this document in English. The duty of the writer of the specification is to translate the design, from all the materials at his disposal, into another language : from the image in the mind of the architect to a technical English description of the work.

The true specification should be in course of preparation all the time that the design is being elaborated by the architect. The general description of materials should govern the details of construction ; and the work of preparing each should be simultaneous.

It would be well if the writing of a specification was encouraged as part of a pupil's work during his articles, rather than the common course of education, which leaves this part of the art to those altogether who have passed through their period of apprenticeship. It would seem in some cases as if the architect-master of the present day followed the discipline of Pythagoras, for it is reported that a probation of five years was expected from his pupils, after which they were instructed in the meaning of the enigmatical sayings in which he involved much of his doctrine.

Though the architect, client, builder, and surveyor have each of them their legitimate views as to the objects and use of a specification, it must not be forgotten by the writer of such a document that, in the course of the use of the specification, views other than the legitimate are not unlikely to be taken—views subsidiary rather than ancillary, and, though sinister, often dexterous.

There are clerks-of-works and there are foremen who will exhibit the art—only gained by experience—of perverting the words used, for what they deem the purposes

of their employers. There are clients who, having obtained a carefully-written specification, deem its possession and application to a different building sufficient reason for dispensing thereon with the services of any professional man. There are architects, proud of their artistic talents, who decline to be trammelled by the technical terms of a specification as vulgarly explained, and who write that document so that they shall not be committed thereby. There are surveyors also who, for want of full discussion on the subject before writing, fail to produce a document which shall prove other than a basis for variations.

One would suppose, and each one does suppose, that there can be no question as to the proper form of a specification. If it be so, the following open points have been cleared up in the education of an architect:—

Whether the document be drawn up on the principle that it should give details for the execution of the work, or whether it should give guiding reasons for adopting one or another alternative treatment of the building. Details no doubt are looked for, but it requires decision of character and full information to avoid the latter course. One serious objection to the giving of reasons in a specification is that the foreman or clerk-of-works, taught to reason thereon, may come to a different conclusion from that of the architect, and may adopt in execution his own conclusion.

Whether the grammatical form is to be Descriptive of the work; Instructive to the contractor; or in the Narrative form with general observations. It requires a disciplined mind to avoid changing from one form to the other in the course of a lengthy document.

Whether the amount of detail given is to be the least which will obtain a satisfactory result, or the utmost that can be required so as to leave no questions for settlement in the course of the execution of the work. To pitch the right key in this respect is a matter requiring great experience.

Whether the usages of the locality are to be adopted, or another class of materials is to be introduced, with the necessary variety of labour.

Whether the concrete image of the building designed is to be presented, making each trade responsible for perusing the whole specification, or whether each trade is to be complete in itself—that is, if matters affecting more than one trade are to be repeated, or if cross-references are to be inserted.

Whether the special conditions of the case are to be paramount, or the details of the work to be done.

Whether the specification shall cover the whole ground, or whether if matters are drawn in detail they need be specified; whether the writer is responsible for the technical accuracy of his description, or whether he should cover his want of precision and the defects of his drawings by sketches.

Before writing a specification its purpose should be fully considered. The following may be taken as illustrations of classes, each of which has its purpose and its adherents:—

The legal specification, based on the clauses of a lease which enlarges

them, keeping within the four corners of the original document, and in which generalities find sometimes legitimate place.

The specification of workmanship only, when all responsibility as to materials (except as to the selection of them) should be omitted.

The specification which includes that of the materials to be used with the trade descriptions and usual tests.

The specification (as were some ancient ones which have come down to us) by reference to existing buildings.

The true technical specification, the proper supplement to the working and detail drawings.

There is also the specification which contains descriptions in the fullest details, with a multitude of tests not intended to be exercised—usually a monument of the literary research of the writer and of the traditions of the establishment to which he belongs.

Much may be said, as regards the order of treatment adopted, in favour of each of the following courses, the varied influence of which may frequently be traced:—(1) Giving directions as to general principles, leaving the details to the common sense and experience of those who have to carry them out; (2) Following the order of the quantities, and in fact only supplying a running commentary upon them; (3) Following the order of the execution of the work; (4) Following the order in which the work would be taken when measured up.

There are a variety of influences which may be traced with effects for good or evil in current specifications:—The influence of change of architectural style, by which is meant the varied view of materials taken in the present day from that which produced the ordinary architecture of our predecessors—iron, wood, and stone being treated constructively, and only in high-class work in other than natural forms. The influence of the client's object—whether it be to produce the best building for the purpose, or the largest building for the money; not forgetting the use of old materials and the resources of the estate or the special productions of the employer. The influence of the archaeological, mathematical, or artistic mind of the writer. The influence of a diffuse or crabbed habit of writing. The influences upon the construction employed of the varying state of the markets and the increasing adoption of machinery. The influence of the amount of clearness, succinctness, and, above all, of patience with which the writer is endowed.

The following are dangers which beset the feet of the writer of specifications:—

(1) Of adhering to a standard specification, in default of due application to the special circumstances of the case; (2) Of rewriting clauses which have been better written before; (3) Of inserting clauses which are too wide or too narrow in expression; (4) Of occasionally breaking out into ultra-detail which may ill accord with the want of detail in other parts of the document, and where the occasional misuse of a term may throw discredit on the whole; (5) Of creating confusion by describing a matter by implication in one place and in detail elsewhere; (6) Of making alterations in

the body of the document without attending to the consequences throughout; (7) Of not filling in all particulars which are not given in the drawings; (8) Of referring particularly to detail drawings before they are made; (9) Of specifying a treatment in one trade, for which the necessary preparation is not also described in another; (10) Of referring to samples before the writer has himself seen them or knows that they are deposited; (11) Of shirking labour and responsibility by the use of general terms instead of giving particulars; (12) Of thinking too much of the detail he is working at, instead of remembering the general character and effect he wishes to obtain.

As to the time when a specification should be written. The architect's specification is usually written after the drawings are made. The surveyor's specification is written after the quantities are taken out. The notes for each of these should be in the hands of the draughtsman who prepares the drawings. Neither the architect nor the surveyor can prepare a complete specification without himself going through every wall from its necessary excavation to its top, every floor from basement to the roof, every pipe from its use to its exit, every room from its carcass to its decoration. The surveyor is bound to take these in order in the preparation of the dimensions, the architect in the preparation of the drawings. The order in each case is dependent on circumstances. The basis of each must be a complete series of memoranda, and on the making of these notes, without cessation throughout the work of each, depends the completeness of the specification.

To bring the subject before you, and to draw attention to the means by which the specification may be made more clear, and with the least waste of labour, these notes have been put together. It would be derogatory to the members of the Institute to give instances of success or of defects in the terms of specifications which architects have produced and which builders have had to work to. Each of us has seen them for himself; each of us continues to learn the practice—may it be professional—and the art—may it be a fine art—of specification-writing; and may each of us learn to improve it by correcting our own mistakes, and not lay too great stress on the errors of our neighbours.

For the practice of specification-writing perhaps the most important mental quality after patience is decision, and I may note the following list of terms, as to the meaning and application of which, before writing a specification, the mind should be made up. On the meaning and use of many of them there are contrary or varying opinions, and perhaps it will not be possible to discuss these various readings without the expression of individual views. If other views than those herein mentioned are, however, taken, let them be clearly expressed in the interpretation clauses of each specification. Nor should it be forgotten that we have in our vocabulary varied terms for the same thing, and that uniformity in the use of them will be of great assistance in making a specification intelligible and in obtaining the desired result from its composition.

"*Allow for*" is not a term which should enter a specification. It belongs to a bill of quantities, and should show that the extent of the work is at the risk of the

contractor. If "allow a sum for" an item described is inserted in a specification, questions arise as to how the sum is to be calculated.

"*Provide.*" This is intelligible if applied to particular quantities of materials and labour. If it is applied to sums of money it needs a very clear interpretation clause.

"*Supply*" is a term which, if used in place of the usual words "provide and fix," will increase the clearness of the specification and avoid some prolixity.

"*Proper.*" Before the introduction, within the last generation, of work in imitation of mediæval structures, this word had an intelligible meaning, as applied to ledged doors, door-frames, and grounds, &c., with fixed descriptions of labour; since so great a variety of views have been taken on the subject of joinery the word has ceased to have the intention of its origin, and has been perverted by some architects, who intend it to include whatever they think desirable. It is safer to fully describe what is intended and to leave out this word.

"*Sufficient.*" This is a legal term which requires breaking down so as to convey the intention of the writer. Its use implies that there is more than one way of doing a thing. To describe the way intended by the writer may save much trouble.

"*Best.*" This is a word which has ceased to have any definite meaning. The introduction of the terms "Best Best," "Double Best," "Improved," "Superior," and the like, in every trade has cut the ground under our feet. To some people's minds it does not convey more than what will pass muster or the best obtainable for the money.

"*Prime cost.*" This requires explanation as to whether it is to be taken from the list price without trade allowances, without also discount for cash, and also whether it have to be increased by establishment charges or carriage or fixing.

"*Establishment charges*" may be referred to, in which case complicated questions arise which it would take up too much time to discuss in the present Paper.

"*To fix*" may include labour only, or labour and the subsidiary materials, such as nails, screws, plugs, cramps, dowels, and the like. There are few occasions for its use which will not require some detail beyond this word.

"*Average.*" This is a dangerous word, as it admits of some of the work described being of less dimensions than are specified, and often nothing short of a measurement of the whole will clear up the doubts thrown on the execution of the work by foreman or clerk of works.

"*Sizes.*" These should be explained as "out of" or "finished," and often at what time or in what position they are to be taken.

"*Attendance.*" The amount of labour and responsibility thrown on the contractor should be clearly explained, and the Employers' Liability Act should be understood before this word is used. The delay occasioned by other tradesmen should be also considered.

"*Reinstate.*" The application of this term to dilapidations is not here considered. To require a contractor to reinstate after accident or after defects, other than those of his own materials and labour, will require a specially-drawn specification. It is

sometimes better for the present use of the building to leave a small defect than to cut the structure to pieces in order to insert new material in construction. Power should be retained by the architect to charge for the renewal when opportunity will allow of the works being executed.

"Local Requirements." These should be mastered before the specification is written and before they are referred to therein.

"Watching and Lighting." This should be explained, whether for the contractor's own work or for other tradesmen, whether for night-work or for day only. The use of gas, firing, and special lighting also varies according to the circumstances of each case. No general clause is in all cases sufficient.

"Search for old Drains." Have some knowledge of where the old drains are before drawing your specification.

"Facilities." These are to be afforded for inspection of work and for the introduction of other tradesmen for fittings during the progress of the contract. It is only fair to define beforehand the extent to which this is to be carried, and the accommodation and responsibilities involved.

"Use of Scaffolding." If this is required for special purposes, or to be specially erected, attention should be drawn to the subject, as otherwise the ordinary words may carry only the use of such scaffolding as is erected for the contractor's purposes, and the extent of this varies greatly in different localities.

"Secret Fixing." The precise mode to be adopted should be clearly studied before writing the description. In joinery it may mean raising the grain before nailing, tongue-ing together and screwing on skew, or wrought tongues and slotted screws with or without plates.

"Concrete." Before describing concrete it is well to make up the mind whether absorbent or non-absorbent materials are to be used, whether burnt ballast is to be allowed or not, whether lime and cement may be mixed together, and whether the material should be shot into trenches from a height, and left untouched under penalty, or whether it is to be carefully laid without dropping and then well punned.

"Art Tiles." Will the architect approve of such tiles if winding and out of shape? or will he insist on having as good workmanship in their manufacture, without seconds, as he would expect from Hollins or from Maw?

"Rubbish and Débris." Both dangerous terms, but occasionally used. They are supposed to mean brickbats. Waste-paper and nightsoil should be specified out of them.

"Asphalt." If tar and sand is what is meant, say so. If superior material in two thicknesses, clearly specify the maker's name.

"Flooring." The mind should be made up as to widths of boards, as to thicknesses, whether from the saw, the mill, or the plane, mode of fixing, quality, finish, and bearing.

"Ironmongery." Decide your sets of hinges and your mastership, and if you begin to give P.C.'s continue to do so throughout.

"Cast and Wrought Iron." Resolve on the tests you will really require, make clear who is to pay for testing, whether the material will pass the tests or not. Make up your mind whether Belgian iron is to be used or rejected. Remember the cost of special rolls.

"Brick Facings." Study the capacity of the ordinary bricks. Every special mould you require will delay your building so many days. If you require all bricks to be firsts, or if you will be satisfied with any percentage of seconds, let it be clearly stated. And as regards pointing, make up your mind, or, still better, ascertain whether the sort you describe is likely to last if executed with the brickwork.

"Old English Bond." London and Manchester understand this term differently. The writer of a specification has made up his mind which he will have, and should make it clear. In any bond decide whether perpends are really to be kept. Remember the necessary position of closers, and that the bricklayer is of all men the most influenced by tradition.

"Trapped." The gases of the present day get through obstacles which in old time were intended to stop rats. The water-supply of the present day forces traps which our forefathers admired. Decision as to the form of a trap is the strongest proof of professional influence.

"Bonding" and "Cross-bonding." The mind should be made up as to whether $2\frac{1}{4}$ " or $4\frac{1}{2}$ " gives the better bond between stone and brick. Remember that the average lengths on the two faces of a quoin-stone, multiplied together, do not give the average section of the stone quoin. State in what cases jamb-stones should bond within the face of wood frames.

"Joggles." Doubt should be inadmissible as to whether the material spoken of is stone or cement, or as to the cases where the joggle should not be stopped.

"Scarfigs." As one preliminary to writing a specification, it should be decided whether these should be described by a general rule or in detail; whether they should be invariably bolted, or whether they are to be used at discretion.

"Fixing Leadwork." Decision is necessary as to the use of bossed seams or wooden rolls, of copper or lead clips, of brass screws and lead dots, as to the widths of laps and the order of fixing the pieces of lead. In some cases a judicious reticence is safer than doubtful detail. He must be an architect of experience and good fortune who can get the work executed as he has described it, especially in step flashings.

"Drain Pipes." You will probably be satisfied with a shorter description than the following:—"The drain pipes to be the best socket-jointed stoneware, vitreous, "imperishable, strongly made, tough, hard, homogeneous, impervious, uniform in "thickness, true in section, perfectly straight longitudinally, glazed inside and out, "free from fire-cracks and flaws of every description." Try the new patent joints before you specify them; define your tests, whether candle, water, or peppermint; your sizes, whether 4" or 9" in diameter; and be sure as to the construction of the bottoms of your access chambers before you bind the contractor as to the mode of the execution

of them. Also be quite sure as to which side of a trap you intend the fresh air to be introduced.

"Centering." State when you wish it to be close-jointed.

"Plate Glass." If you wish the edges blacked, let it be noted. Do you object to the reflection from bad glass? Some admire it.

"Custom of the Country." This should be studied with reference to stone facing and the mode of pointing; slating, and tiling of all sorts, with bedding and torching appropriate. The selection of stones, and the appropriate treatment of each; but this is too large a subject for the present purpose.

And among the many things likely to be forgotten may be mentioned: The possible necessity of driving the planking of foundations; the application of a rule as to footings to piers and special cases; the liability to misinterpretation of the width of bed of a stone; the amount of labour carried by descriptions such as moulded, stopped, enriched, fitted, veneered, and the like; the accesses to cisterns, taps, and many other things; the selection of sizes and shapes to suit the market for the several materials.

The objects of a writer of specifications will be best gained if he first of all place himself in the position of his client, but with his own better knowledge as to judicious expenditure; in the position of the builder, but with an art-knowledge which the builder may not have, as to the materials available; and in the position of the clerk-of-works and foreman in having to obtain from the workmen intelligent labour; in fact, by bringing to bear all his knowledge upon the true instincts of a building, constructing animal, and conveying that in such clear language that it may form the basis of a contract.

THOMAS M. RICKMAN.

* * * The Discussion [see verbatim report in JOURNAL OF PROCEEDINGS, Vol. V., pp. 165-72] of Mr. Rickman's Paper was opened by the Chairman (Mr. Cates), and continued by Mr. E. T. Hall, Professor T. Roger Smith, Mr. W. White, F.S.A., Mr. Lacy W. Ridge, Mr. Lovegrove, Mr. W. H. Atkin-Berry, Professor Aitchison, A.R.A., and Mr. W. Woodward. A brief abstract of their remarks, and of the reply made by the author of the Paper, is here appended:—

MR. ARTHUR CATES, *Vice-President*, thought few architects dealt with a specification in the very explicit manner suggested by Mr. Rickman, and that a general description of the qualities of materials and of the workmanship was often thought sufficient, leaving elaborate drawings with annotations to convey the intentions of the architect. Mr. Rickman's system would to a great extent obviate difficulties which might arise from omissions in conveying the exact meaning to the workmen; but it entailed the architect being thoroughly acquainted with the details of every trade. He thought the architect would probably receive great assistance, not only from the specification draughtsman in his office, but also from the quantity surveyor, whose careful revision of the specification during the process of taking out the quantities would supply many of those minute details which the architect

had perhaps in the first instance overlooked; and in that respect he considered the services of the quantity surveyor would be very great to the architect, as in the process of analysis the surveyor would necessarily detect essential matters of detail which in the broader view of the architect might be overlooked. There was no doubt as to the necessity for patience, decision, and accuracy of language; and, unless an architect had cultivated a habit of precision of language, decision would be of little value. He considered litigation connected with building matters arose too frequently from what he might call the looseness of expression and want of precision—where the intentions were expressed by words which, when read from another point of view, and read many months afterwards in a reference or in a court of law, would bear an interpretation entirely different from that which the architect had intended to place upon them. The observations upon “best” and “prime cost” he considered also of great value; some years back it had been the ordinary practice to introduce at the head of the specification a declaration to the effect that the word best throughout the specification was intended to be used in its natural sense, and that no such perversion as “best best” or its equivalents would be entertained. There was another important point, and that was the very complicated question of the employment of other tradesmen than the contractor, and the facilities to be provided for the execution of those works which were not paid for by the contractor, or which were ordered by the architect as a provisional amount, and concerning which the heartburnings and differences between the contractor and the special tradesmen, and the architect and his client, were often exceedingly great, and sometimes led to considerable litigation. He believed that the practice of employing special tradesmen had become so general that it was most important that the manner in which provisional amounts ought to be dealt with should be clearly expressed.

MR. E. T. HALL, *Fellow*, considered the architect should draw his specification as though no technical person like the quantity surveyor was to follow him; and that writing specifications was eminently the work of the head of the office, pupils learning how to do so by copying them. Certain items he thought might reasonably come under the heading “allow for,” such as “allow for the necessary shoring and boarding-in of adjacent building disturbed by removal of the party wall.” “Prime cost,” he held, could have but one meaning—the first cost which the builder paid for the article specified—and that meaning should be clearly laid down. With reference to the question of reinstating, provision should be made in the conditions of contract for the architect’s discretion to be used, as also in the case of timber specified to be absolutely without sap. Having referred to the questions of watching and lighting, searching for old drains, and asphalt, Mr. Hall dealt with the term “torchling,” as to the meaning of which he had found that considerable difference of opinion existed. In Sussex it meant simply pointing the inside of the tiles with mortar, just covering the joint; the system he adopted was to render the whole underside of the tiles flush with the battens. With regard to plumbing, provision should be made by means of a stop-cock for shutting off the water in the rising main, which would enable the bursting of pipes to be prevented by having no water to freeze in them; while another stop-cock where the supply-pipe left the cistern would afford the means, if the apparatus were out of order at any particular spot, to shut off the water in that branch, leaving the rest of the sanitary appliances at work. Where those precautions were not taken, if one branch got out of order, everything else was thrown out of use.

PROFESSOR T. ROGER SMITH, *Fellow*, believed a valid, and in many respects a good, specification might be written comparatively short, describing the work in general terms, and not going into particulars in any part. If particulars were mentioned at all they must be continued throughout. Years ago, buildings were done by various tradesmen; later on, one contractor did every class of work; now the first system seemed coming into vogue again, for a money provision meant simply employing another tradesman. Almost the sole reason for including separate estimates by the help of money provisions in one specification was to get the control over them exercised by the general contractors. He thought it worth considering whether it would not be avoiding disputes and difficulties if the architect made a series of distinct contracts for his employer with many of the special tradesmen, and simply a contract with the general contractor that in respect of their work he was to provide the necessary attendance and scaffolding. If there were no question of a contract the Professor doubted whether with good drawings anything more than a general specification was necessary; and, if that were so, the specification ought to be such a document as the contractor could be called upon to carry out in every description; and it then followed that the nearer it ran to

the quantities the better, because in all work the quantities were practically the foundation of the contract.

MR. WILLIAM WHITE, F.S.A., *Fellow*, considered money provisions required to be carefully understood and described in the specification to show the understanding to be made between the builder and the men supplying special work. He thought a specification should simply describe the work and include in all items the manner in which the work was to be done as nearly as possible; and that the proper place for describing the duties of the contractor was in the contract. The writing the specification ought to be done immediately upon or *pari passu* with the preparation of the drawings, and should be drawn by the architect distinctly and clearly for the surveyor as well as for the contractor.

MR. LACY W. RIDGE, *Fellow*, said the subject of "prime cost" was a difficult one, and as it was a very great advantage to employ men who devoted their whole time to specialties, the question of "prime cost" and the builder's profit must be considered. There was no reason why a contractor should only watch his own works; the watching all works would be taken by him just the same as the supply of water and everything else general to the building. It was only fair that searching for old drains should be followed by a provision for money, for, if the architect could not define the drains, the builder certainly could not put down a sum for the work. He did not understand Professor Smith's remarks about writing a specification in general terms; where the object to be attained was the making of a contract, a specification could not be otherwise than full. He felt a little difficulty in regard to writing a specification by trades. Things which used to belong to the plumber were now to a large extent earthenware and stoneware. A heading, such as "Sanitation," was now required so that the work of closets and pipes should be all together. With regard to the specification following the quantities and the quantities following the specification, it was the duty of the architect to say what he meant, and to put it in the specification; and it had nothing to do with the quantity surveyor.

MR. H. LOVEGROVE, *Associate*, thought the best way of placing the matter in the specification was in order of execution; and the architect should then consider the building in its various stages, and carefully describe each operation. He thought it should be clearly laid down that prime cost meant the money actually paid by the builder to the merchant, and then the builder's profit should be added to that amount.

MR. W. H. ATKIN-BERRY, *Associate*, was glad the question of prime cost had been dealt with, and also that the specification was still to be regarded as the work of the architect, and not of the surveyor, as with many had become the custom.

PROFESSOR AITCHISON, A.R.A., *Member of Council*, thought most architects who knew their business could write a good specification if they had time, quiet, and the drawings before them; but frequently they were pressed for time, and worried as well, and were urged to get the work out for tender. The specification was then done in a perfunctory way. There were great advantages in employing a contractor; but if first-rate work was wanted it was better to go to the master-tradesman of each branch, as he took a pride in the excellence of his work. The Professor advised all architects using moulded bricks to insist on a larger percentage than the ordinary one for themselves, and not to bind the builder to time, because it might be impossible to carry out the latter condition,—the bricks could not be moulded till the contract was let, and might turn out badly in the burning, when the architect would have endless extra trouble and annoyance.

MR. W. WOODWARD, *Associate*, considered the theme running through Mr. Rickman's Paper was that it was not well, it was not proper, that the writer of a specification should depute to others the elucidation of that which, by a little extra trouble, he himself could elucidate. Supposing the architect died, he thought the specification, taken with the drawings, ought to be sufficient to secure the entire carrying out of the work in every detail as the architect had intended; and to effect this it was obvious that the specification must be written with considerable detail. If an architect undervalued the importance of a specification it would be to the disadvantage of his client and his building, and certainly to his own detriment as an architect.

MR. T. M. RICKMAN, F.S.A., *Associate*, in his reply said he had not felt it possible to compress what was necessary to be said on the general question of provisions into a paragraph in a paper on specifications; the real difficulty in dealing with provisional sums was the payment through the contractor. What was really necessary in order to clear up the difficulties was that architects should

have a better understanding with their clients; that the clients should better understand what the position of the contract was—what could be contracted for, and what items should be placed, at a price already settled, in the hands of other tradesmen. If the client understood really what the position of these matters was, he would very soon find it was far better for him to pay for those things direct, and to pay for, among other such things, the surveyor's quantities direct, than for those sums to pass through the hands of the contractor, who would necessarily pass the plane over them. A specification must be written for separate trades because the workmen were still artificers in separate trades, and it was the foremen of those separate trades who most carefully read the specification; but, although the architect had to write the specification in trades, he must write it as a whole.

LVIII.

ON LAYING-OUT STREETS FOR CONVENIENCE OF TRAFFIC
AND ARCHITECTURAL EFFECT. By J. J. STEVENSON, F.S.A., *Fellow*.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

THE march of improvement, wherever over the world modern civilisation is spreading, is changing the aspect of cities and towns. There is more space, the streets are wider and more regular, the houses larger, the rooms loftier; there is better sanitation and better building. But the improvements have not been gained without some loss. Our new towns, and new streets in old ones, are dull and uninteresting; they have not the charm of old ones; we do not go out of our way to see them; if stranded in them in our travels we find there is nothing to detain us, and we get out of them as soon as we can. As travelling has become easy and universal it is less worth doing; there is nothing interesting and characteristic to see, unless it be in some decayed and unprogressive old places which the tide of modern improvement has left untouched.

I think it is not unworthy of the consideration of the Institute to ask whether this is inevitable, to examine into the causes of the general dulness and want of interest in modern towns as compared with old ones, and to see whether along with our modern improvements we might not still have the old charm. In an old town there is something attractive at every step; the streets wind irregularly so that we cannot see the whole of them at once—at times contracting to narrow straits flanked by perpendicular cliffs of houses, at times widening into sunny openings; each building is different, some large and magnificent, others small and even mean, some low and some lofty; towers and dormer-windows break the sky-line, steeples end the vistas of the streets, projecting oriels vary their surface. The carriage-ways may be rough and narrow, and possibly dirty; the pavements non-existent, or diminished at parts to nothing by the projecting houses; but, notwithstanding the smells, we linger and admire, and even produce our sketch-books.

All this is disappearing rapidly—"and a good thing too," it may be said. Streets are widened and straightened, projections cut away, uniformity is the rule. The new streets are all much alike; their sides flat straight walls, with holes in them, with more or less trimmings round them; no separate buildings each with its own individuality, grouping into an interesting and characteristic street view, but the different properties undistinguishable, divided only by an invisible central line of party-wall.

Much praise has been bestowed on the new Paris of the late Baron Haussman, and regrets have even been expressed that we could not have had him do the same for London. New streets for traffic were essential in Paris, and the work has been thoroughly done. Wide boulevards, carried out by despotic authority with logical thoroughness, have provided communication in all directions, every consideration being overridden in carrying out a grand conception. The dominant idea is the straight line. This was not always possible, even to Imperial autocracy: two thousand years of existence had left some lines and landmarks which had to be respected; but one new street runs dead straight for over two miles, a weariness to mortals; the old Cité of Lutetia, which used to rise on the mud island in the Seine, defined by the old tall houses which rose from the water's edge on the lines of the old city walls, has been obliterated, indistinguishable from the streets on either side of the river; the west front of Notre-Dame, on its large new square, looks half the size it did when it rose towering above the old houses. Paris is cleaner and easier to go about in.

But it is not all gain. Its interest is largely gone, rents have enormously increased, and the cost of rebuilding has saddled the city with a debt which has made it one of the dearest places in the world to live in.

It is a question whether, with some greater consideration for old associations, some less abject worship of the deity of the straight line, all the convenience wanted might not have been obtained, cost saved, and the city left more interesting. Many Frenchmen, especially artists, think so. But art seems losing its influence in its old home. Those who know France and Frenchmen mourn the decay of the French character, spoilt by the luxury fostered by Imperialism, by Bourse speculation and greed. In her lowest need, while paying the indemnity after the German war, France clung to her art, voting subsidies to foster it. But the artistic monstrosity which is being perpetrated in the Eiffel Tower, against the protests of her best artists, seems to me to show that even her love of art is leaving her.

It is the same in Rome. The new streets necessary for her expansion as the capital of one of the Great Powers excite universal condemnation for their dreary ugliness. Florence, which till our time was much as the Medici left it, is degenerating by way of improvement into dreary commonplace, and the latest project proposes to sweep away the whole heart of the city and substitute a wide straight street of the modern type. In provincial towns also the old picturesqueness is disappearing. At Rouen, when I was last there, the clock-tower over the Rue-de-l'Horloge was getting into the state of disrepair which parsons allow their churches to fall into when they want thoroughly to restore or rebuild them. In Cairo the proclivities for Western

civilisation of the late Khédive have replaced the old streets with shoddy imitations of the second-rate houses of a French suburb, and the charming old mosques of the Khalifs are fast going to ruin.

In the towns of the New World, in America and Australia, the new wealth produces costly and handsome buildings, but rarely any street views which an artist would care to make the subject of a picture.

At home, with us the old tradition of picturesque street architecture survives, and of late years has shown new development. There are towers and dormers and projecting windows. But I have never heard of artists being inspired to copy them. The streets somehow have not the charm of the old ones. We allow the old characteristic monuments of our streets to perish. There was no need for destroying Temple Bar. Widening the street north of it would have been better for the traffic. And now we have an active band of enthusiasts for improvement bent on the destruction of the Church of St. Mary-le-Strand, the greatest ornament of the street.* If this is the case (and in making these assertions I think I am stating a general impression), the causes of it are worth the consideration of a body of architects like the Institute; for, if architecture be an art, including something more than merely stable building and sanitation, correct estimates and knowledge of accounts, our prosperity, and even our existence as a profession, depend on the public caring for and fostering it as an art, as a means of making our towns interesting and beautiful, places which we can love and care to stay in.

Of the causes which produce the dulness of our modern towns as compared with old ones, some are probably irremediable. The picturesqueness which arises from decay and instability the most enthusiastic worshipper of antiquity would not desire to reproduce. The interest of old associations, of historical events, of even the uneventful lives of generations passed away, we cannot have in new buildings. It is this consideration which makes the rebuilding of old halls of the City Companies, like the Carpenters', and of the old Colleges at the Universities, a loss to mankind, even if the new buildings which replace them equalled the old ones in their architecture. Another charm of the old towns which we fail often to attain arose from their buildings being better in their architecture. From whatever causes (and these it is not my present purpose to investigate), there were no monstrosities. There was a standard of criticism. Every age had a style of its own, understood even by common country builders. Buildings were criticised and abused; King James's Gothic was laughed at by classic purists; the tower of the schools at Oxford was denounced for the infraction of the canons of architecture in setting the five Orders one above the other; and it is said that the architect of the Whitehall front of the Admiralty committed suicide in shame of the bad proportions of his portico. If architects nowadays were as conscientious there would be more room in the profession.

It must be admitted that of late years there has been a marked improvement in

* Since this Paper was read, the repair of the Church of St. Mary-le-Strand has been commenced by public subscription, under the superintendence of Mr. J. Macvicar Anderson, *Vice-President*.

our street architecture. Architects are actually employed now for street houses, sensibly augmenting the amount of the work of the profession ; houses have often an individuality of their own, not, as hitherto, indistinguishable from their neighbours on each side ; and while the old dulness is too often still reproduced, or, what is worse, monstrosities bred of conceit and ignorance are perpetrated by builders and even by architects, a large number of private as well as public buildings have of late adorned our streets which would be a credit to any age or style. The old system which prevailed while national styles still existed, which ensured us good buildings from common builders in every county town and village, has gone for good—the human race will submit, no more in building than in other things, to the trammels of tradition ; whatever excellence is produced will be due to the knowledge, the skill, and the genius of individuals, which, copied by others, will produce fashions rapidly changing, instead of the old slow steady progress of traditional styles. We must make the best of our circumstances. It is no use advocating the revival of the old system of styles—as well try to revive the dead—or advising the suppression of architects in order to have good architecture. In their efficiency lies its only hope, and we may congratulate ourselves that among our body there are many, and an increasing number among its younger members, who, grounded in the knowledge of what the art has done, restrained from extravagance by being permeated by the merits and restraints of old work, possess the originality and genius to develop old styles and fit them to our modern use.

The cry we sometimes hear for a new style is foolish—no individual, no single generation, could create it ; the old styles are the result of the continuous improvement of successive generations ; but, while taking them as our models, we may show true originality by modifying them, and adding new developments to suit our modern necessities. In what has been already done there is good hope for the future.

But even good architecture does not make our modern streets as interesting as old ones. There is a prevailing sameness in them ; each building, however good its architecture, is only a portion of a street frontage, and its architectural effect is lost. In Venice the old palaces mostly stand isolated, each separated from its neighbour by a canal—sometimes only a few feet wide, but enough to give it isolation. The curves of the canals put the different buildings in different lights, and give individual prominence even when they are not separated from their neighbours by an open space. The present infatuation for making streets straight is really curious. No trouble or expense is thought too great to effect this object. For the sake of it the building plots, which are best rectangular for each separate building, are left any awkward shape they happen to turn out. Old buildings, valuable for their beauty, and even for their use, are pulled down when a slight alteration of the street-line might have saved them. There seems to be an idea that a straight line is the perfection of art. But it is not a beautiful thing. Nature abhors it. In Greek temples there is not a single straight line ; when statues are placed beside them their pedestals are often a little out of square.

An artist, says Mr. Ruskin, can draw every line except a straight one. The modern passion for it arises from confounding mathematical perfection with the perfection of art, and also perhaps because it saves the surveyors trouble. To condemn it as the rule for streets will seem to many absurd. It is the easy and natural line to follow. But whenever art has been highest it has been avoided, as in the entasis of classic columns and Gothic spires.

Streets seem often to be laid out on the idea that we are to look down on them as if we were birds in the air or up in a balloon. The view we get of them from this position is so rare that it need not be taken into account.

The designer seems often to think he has achieved a work of art when he has made an arrangement which looks pretty on his paper plan. What is wanted is that the streets should look well as we walk along them, and all experience proves that this is best attained by some departure from the absolute straight line. This is characteristic of all the streets most celebrated for their beauty—the High Street of Oxford, Grey Street in Newcastle, the Grand Canal of Venice, the Lung'-Arno at Pisa and at Florence. As such streets wind, even if it be but gently, the buildings lining them are placed at an angle of perspective in which they are better seen, each building stands out better in its own individuality, and the change of angle gives varying effects of light and shade, just as the varying light on a moulding makes it more interesting than a flat band of stone.

An architect, if he only knew it, has cause for rejoicing when the site of his building gives him a broken line of frontage. If he works the irregularity into his design he has a legitimate chance of being original. The subtle charm of the front of St. Mark's at Venice arises partly, as Mr. Street pointed out, from the line of front being broken, the centre being set back. But the restorers have started their new work apparently with the intention of rebuilding the whole front on a straight line, perhaps one of the most remarkable instances of the blindness of men who get possessed with this fixed idea. The authenticity and the antiquity of the Church, the obvious intention of the original designers, the charm of the effects of time, even the considerable cost, all go for nothing compared with the paltry object of their worship. They think themselves much cleverer than the old builders, and flatter themselves that they are correcting their mistakes. But with the piazza open in front, there was no need for the designer to break the line of building unless he wished. If he had desired a straight façade he could have stretched a line and built to it.

Ought we, then, for the sake of appearance, purposely to break and make irregular the straight line of our streets, which is the obvious and natural way of laying them out? To many this will seem absurd. But we do it on our buildings for the sake of appearance, in the entasis of columns and spires, in the intakes of towers, in the curves of roofs. There is no consideration of convenience against it. It is urged that a street should be straight, as a straight line is the shortest distance between two points; but any addition to its length from all the bending wanted for the sake of

appearance may well be considered a negligible quantity. No doubt it would give more trouble in laying-out streets and in designing the buildings; but all art gives trouble; it is in overcoming difficulties that its triumphs have been achieved.

No rule could be laid down for doing it. To attempt it would do the very thing which it is the object to avoid: the wearisome regularity. And there is some danger that to make streets irregular without obvious cause might look like affectation. Designers sometimes start with the idea of making a pretty-looking plan with the curves carefully drawn, forgetting that the result will never be seen in the actual work. What the experience of existing streets shows to look well is not that the building-line should be a continuous curve, but a broken line made up of a succession of straight lines, each the frontage of a separate building, which thus has its front straight in plan. This arrangement sometimes comes naturally from the configuration of the site of the town—as at Durham, where the old streets wind round the peninsula which the cathedral crowns; or at Bourges, where each successive extension of the town has been a concentric circle round the old hill-fort of the Bituriges which Cæsar stormed.

The builders of old streets, fortunately for their artistic aspect, had no theodolites. The lines, when not dominated by some obvious natural configuration of the ground, seem to have been determined by some accident, following perhaps an old footpath bending to avoid some obstacle or marshy ground, but keeping a general straight direction. Slight as are the bends of Oxford Street and the Strand, or of Grey Street in Newcastle, they are all that is wanted to give interest and effect.

In the New World any departure from straight lines and rectangles is more difficult, as these are often the basis of the division of the country. Instead of the natural divisions of rivers and mountains, a parallel of latitude or longitude, a thousand miles or two long, is taken as the boundary-line of a State, and this primary factor is apt to project itself into all minor divisions of the land. In mapping out a new country it saves a deal of trouble; and there is, I must confess, a simple grandeur in it which is fascinating. It was the idea of Imperial Rome. She stamped her mark on the countries she conquered in the lines of her roads running straight across them, with a sovereign, one might almost say a brutal, contempt for natural features or even convenience of traffic, disdaining to turn even to avoid the steepest hill. But the Roman spirit was not artistic. Grandeur and admirable organisation characterised her rule, but also a singular defect of artistic development. Everywhere in her empire, from Palmyra to the Tyne, there is to be found the same rather dull and illogical style of architecture, with badly-carved Corinthian capitals and coarse mouldings. In this question, viewed as a question of art, one need not take the Romans as a guide; and, as a matter of convenience, there is no reason why the natural configuration should not still be a determining factor in the lines of streets, as the bends of a river or the windings of a hillside. On an open level site variation would be more difficult. But even there excuses might be found for breaking the uniformity, if it were not for the fixed idea that straight streets are an object of

perfection to be striven for at any cost; but at least let us not spend our energies and the public money in rectifying bending streets where they exist, and let advantage be taken, in laying out new ones, of every circumstance which gives an opportunity of departing from the dull regularity of a dead straight line.

I presume the recent improvements at Charing Cross, Piccadilly Circus, and Hyde Park Corner may be taken as exhibiting the highest development of modern ideas which the circumstances would admit. I will assume that the convenience of the traffic was the main object aimed at. Now it is obvious that where two streets cross there is double the amount of traffic of each of them, and the space at the crossing should consequently be doubled in extent. Oxford Circus and the old Piccadilly Circus were properly designed to carry out this idea, but the Hyde Park improvement ignores it. Piccadilly, at the point where Hamilton Place strikes it, is no wider now than it was before, and it is therefore not surprising that the block of the traffic there is as bad as ever it was. Several plans were suggested for this improvement—some with tunnels or subways, in the vain expectation that vehicles would use them; one, by our Council, better in every way than the one carried out—but none I think in which there was recognition of the necessity of providing doubled space for doubled traffic. If Piccadilly had been widened to ninety feet of roadway as far eastward as Park Lane by frankly bending the southern pavement southwards, it would have given no more space than was needed for its own traffic and that of Hamilton and Grosvenor Places and the entrance to Hyde Park.

Besides giving for double traffic the same space as for single, several other principles seem to have guided the designers of these improvements; one, that the routes for vehicles should be in the gentlest possible curves; that a cab cannot turn in a right angle; that, compared with this, the convenience of foot-passengers at the crossings is an altogether secondary consideration; and that it is of sovereign importance that a roadway should never vary in width. I venture to think that all these principles are wrong: that the convenience of foot-passengers ought to be the first consideration, that a cab *can* turn in a right angle, and that making a street a little wider at parts than the minimum is not only no harm, but may be a practical convenience in giving an opportunity for faster vehicles to pass slower ones. The Hyde Park Corner improvement provided a crossing on the south side for foot-passengers, about 300 feet long, with an island in the middle. To attempt to cross meant undertaking a voyage of considerable difficulty and danger. Cabs cross diagonally, consequently occupying a much larger portion of the space for foot-passengers than if they crossed at right angles, chasing you from behind, and charging you in front. This crossing has now been abandoned and the islands removed, proving that experience has shown the badness of the conception. I do not know who was the designer of this improvement, but I should like him to have had personal experience of its practical result by frequent exercise on the south crossing. While the ways for vehicles have been made so smooth, it is found in practice that they do not use them. The omnibuses to Victoria, instead of availing themselves of the gentle curves provided for them, persist in going

to the corner of the Hospital, preferring to encounter the difficulty of turning at a right angle to losing the chance of picking up passengers.

A large part of the cost of this improvement was incurred in moving and rebuilding the Wellington Arch. It was better where it was. It has been stuck down in a hole, below the level of the main thoroughfare, on a slope, instead of its former level base, and without any apparent relation to anything around it. This part of the scheme was intended, I presume, for architectural effect, for the arch might have been left as an island in a crossing, as in the Institute plan. As regards both convenience and architectural effect the designer of this improvement may be congratulated on having made almost every mistake that was possible.

The improvement made at Charing Cross when Northumberland Avenue was formed, so far as convenience is concerned, has not, I think, been found in practice a marked success. The same principles seem to have determined it—gentle curves for vehicles, keeping the roadways a fixed width even where extra space would have been an advantage, and ignoring the convenience of foot-passengers by long crossings which carriages cross diagonally. It forms a sort of archipelago of queer-shaped islands, whose forms have been determined by these rules; and the crossing for foot-passengers from the south pavement of the Strand to Cockspur Street (about 200 feet across, with the risk of being run down in making the different islands) makes it one of the most difficult pieces of navigation in the Metropolis.

The late improvement at Piccadilly Circus, with its narrow building sites controlled by ancient lights, its queer muddle of roadways, pavements, islands, and crossings, adorned by the Pavilion, with its absence of any idea of architectural effect, will remain as a monument to keep green the memory of the Metropolitan Board of Works, which has ended its career unwept, unhonoured, and unsung. The problem, perhaps, was a difficult one; but if the designers could have departed so far from their fixed ideas as to allow their roadways to vary in width, to give increased space for crossing lines of traffic, treating it as an open space instead of a ganglion of streets which on no account must vary in width, even when increased space would be of advantage for accumulated traffic, and if the general architectural effect had been considered, of which there is no sign, a result more worthy might perhaps have been achieved.

I do not know what hope there may be of a change in these respects. It means the adoption of new aims and ideas in the designers of our streets, the abandonment of the notion that varying width is any objection in a roadway, that a straight line is the perfection of art, that artistic results can be produced by a theodolite, with the endeavour, and also the artistic capacity for laying-out streets so that their buildings shall group into an artistic architectural composition.

Another cause of the dull regularity and uniformity of modern towns is the working of Building Acts. These are a necessity; but the effect of a uniform law is to produce uniform results, to put a prohibition on variety. It is true they only prescribe a limit, as that party-walls shall not be less than so many bricks thick, or that buildings shall not be more than a certain height. But the limit is apt to become

the rule, and the nature of rules, as the word implies, is to produce regularity. This tendency has often been noticed in sanitary regulation. A code of rules may be up to the level of the science and ideas of the time when they are made; but they cannot foresee future advance and improvement, and therefore frequently result in checking it and in preventing development. I am sure this has frequently been the experience of my brother members.

On the other hand, it would not be advisable to leave to officials the decision as to what might be allowed, unless one could guarantee their wisdom and willingness to give sympathetic consideration to suggested improvements and new developments in construction and architectural effect. Some of them might do so; with others it might be merely an irresponsible tyranny, or an insistence on fads.

For the sake of liberty there must be rules. While architects, working for rich and generous clients, might be able to improve on existing methods, the jerry-builder, who wants to put up as cheap and shoddy a building as will be allowed, has to be taken into account. One principle is obvious, that the restrictions should be as few as possible, for every restriction tends to hinder variety and new development. Another principle is that restrictions should be limited to sanitation, safety, and sound building. They should not trench on the province of the art of architecture, which, so long as it does not contravene these necessary rules, should have absolutely free expression and development. I think the Building Acts of London, and still more of other towns, might with advantage be amended in these respects.

I never, for example, could understand the necessity of the provision that the woodwork of windows should be kept four and a half inches back from the wall-face. I have heard it suggested that it is to prevent fire spreading; but, if the fire is attacking the windows, its having to go four and a half inches more is no appreciable additional protection. Besides, when window-frames are attacked by a fire it is from the inside, the strong draught of air inwards to supply the fire generally preserving them unburnt. Others say that it is to avoid the risk of their falling out in case of a fire—which, however, they have no tendency to do. Another explanation of the restriction is that it is intended to prevent the reverting to the old system of making external walls a wooden framework, with the interstices filled in with brickwork. But this could be done by a simple definite prohibition. I suspect its authors enacted it with a view to architectural appearance, as windows flush with the wall were supposed to contravene classical propriety. The rule is constantly broken by allowing outside sun-blinds and wooden shutters. It is a serious hindrance in attaining architectural effect in simple brick buildings; it makes the windows shabby-looking outside, and the walls inside look thin. In any future revision of the Building Acts this restriction should not be retained without better grounds than seem to have been shown for it. Even the restrictions against wood construction beyond the wall-surface seem more stringent than necessary on account of fire or stability. Houses do not catch fire from the outside of their fronts, and making such structures both stable and lasting is a problem of the simplest nature.

The rules relating to fire-resisting materials and the best forms of construction to prevent fire want revision. Wood is condemned on this ground, while iron is allowed; but wooden beams resist fire much better than iron, which stretch, and push out the walls; while cast-iron flies with the water. But this is a subject which merits another Paper by some one of practical experience in fires. One proviso is beyond doubt, that as to party-walls, which, however, is as old as the time of King John.

The prohibition in Building Acts of such projections, whether of wood or stone, beyond the wall-surface or the building-line is one of the main causes of the monotony of our streets, and their revision in this respect is, I think, worth the consideration of the Institute. It is impossible in a town to allow the same freedom as in the country, where there are no contiguous houses. The rights and convenience of adjoining owners must be considered. A man must not build so as to block out his neighbour's view along the street. Projections should not therefore come within an angle of forty-five degrees from the boundary; even a farther distance might be better. An exception may be made in the case of porches, which in ordinary London houses are generally at the side, and only one storey high; though the practice prevails of putting glass conservatories on the top of them, which not only shut out the view as much as a more solid structure, but give a flimsy character to the architecture of the street. The conditions being observed of respecting our neighbours' rights, the removal of restrictions on projections would do much to enliven our street architecture. The tendency is to increase these. The signs hanging on ornamental brackets, which were an interesting feature in old streets, are forbidden. I was told by an architect that a District Surveyor had objected to an ordinary balcony at the first-floor, though it projected only over the area belonging to the house. Hanging oriels, a charming feature of old English architecture, are forbidden even over one's own ground—with the idea, I believe, that the constructive skill of the present day is inadequate to build them safely.

The amount of surface projection beyond the building-line must necessarily be limited, else it might result practically to advancing the whole building-line. If a proportion of, say, a fourth or fifth of the surface of the front were allowed to be projected anywhere on the façade that the architect thought good, but no portion of it, except low porches, within, say, fifty degrees of the boundary, an amount of freedom in their designs would be given to architects which would go far to enliven the monotony of our streets. The extent forward of the projection must also be limited. A limit of four feet, unless perhaps for open porticoes, would give an architect all the freedom he needed.

There need be no objection to projections over the ground belonging to the building. In old towns they were permitted over the streets, and I do not know that any practical harm would ever result from them now, so long as they left the pavement clear, while they would add an important element of beauty and interest. The portico of Hanover Chapel at the top of Regent Street projecting over the pavement gives the street, in spite of the stucco houses, an element of ancient grandeur; and at Newcastle the similar portico of the theatre gives Grey Street the same effect.

It is worthy of consideration whether it might not be possible to draft a regulation which might permit such projections, with marked advantage to the picturesqueness of our architecture, and without injury to public rights. It is easier, of course, to forbid them.

Some restriction is necessary as to the heights of buildings, partly with a view to amenity, partly to preventing the shutting-out of sun and air. There is already such a restriction in the right of ancient lights—which acts, however, in a perfectly haphazard and irregular manner, depending on mere accident, and consisting in stealing a neighbour's property if he does not look out, at cost and trouble to himself, to prevent it. I believe England is the only country where the law recognises such a custom.

It does not hold in France or Scotland, nor, I believe, in any of our colonies. In Scotland a man must depend for his lights on his own ground. It is a private, not a public right, and it has no value in securing general light and air. It rather tends the other way, enticing the owner to build near his boundary, and even on it, on the chance that the attempt may not be noticed and his neighbour's property be gradually stolen. I gathered from the expression of opinion at a recent meeting, when an excellent Paper was read on the Building Laws of Paris, that my brother members would approve of its abolition.

This could not be done at once. Owners could not be deprived of rights already acquired and sanctioned by law. But they might be compelled to take compensation for them assessed according to the injury done them by a building a man might erect on his own land, instead of the possessor of ancient lights having, as now, the absolute power of preventing a man using his own land, or of extorting compensation in excess of the injury. In any case, the injustice might be stopped for the future by a simple proviso that, when not already acquired, no rights of ancient lights should in future arise.

In the public interest there should be some limit to the height of buildings. Mere height is no harm in a tower or spire, for its area is moderate, but such a huge mass as the structure known as Hankey's Mansions at Westminster is an injury to London; and it is all the worse that these, as well as the similar buildings next the Knightsbridge Barracks and the Albert Hall, are beside open parks, where their huge mass is conspicuous. Even the architecture of the Albert Mansions does not redeem their offence of swamping by their size the Albert Hall, which ought to have remained prominent among the neighbouring buildings.

The consideration that parts of a building, such as a tower or spire, may be carried high without harm makes an absolute limit inadvisable. Such a limit tends to dead monotony, as the experience of Paris proves. It is, of course, the easy thing to do. There would, no doubt, be some difficulty in framing a restriction which, while keeping down the general height, would allow portions to rise in the air, giving breaks and variety in the sky-line. This result might perhaps be attained by allowing a building to rise higher in one part in compensation of its being kept lower in another, by allowing a fixed area for the façade, to be disposed in any form the designer pleased,

so that by reducing the general height he might vary his sky-line by dormer-windows and occasional gables; and additional liberty might be given, at the discretion of the authorities, where it could be shown to be for the public benefit.

If the result were desired, and it is surely desirable, it would not, I think, be found impossible to draft a regulation to permit and to promote it. The usual method in existing regulations is to limit the height of walls and roofs of buildings in proportion to the width of the street they stand in; in Paris no projection, however small, is permitted beyond a definite line. If the intention was to secure monotony the proviso is admirably calculated to produce it.

Low houses do not necessarily make a healthy or pleasant town; what is wanted is sunlight and free circulation of air, and this would be better attained by regulations which would leave part of the ground unbuilt on, even if the buildings on the remainder were allowed to rise higher.

The present laws produce results such as are to be seen in the suburbs of Manchester—endless rows of mean, low houses, to which no genius could impart architectural beauty or interest.

Nor is it a healthy mode of building, for the air is stagnant, there is nothing to cause its movement and circulation. In old towns, though the streets might be narrow and the houses tall, there are occasional wider, open, sunnier spaces, where the air becoming hotter a current is drawn to them from the narrower, colder streets, thus causing movement and circulation of the air.

Supposing the number of inhabitants or the cubical contents of building to the acre were fixed, it would give a pleasanter and healthier arrangement to make the buildings higher and leave more ground unbuilt on. In arranging a workman's town, a *cité ouvrière*, this would leave pleasant open spaces and squares and playgrounds for children, instead of the monotonous streets arranged for carriage traffic where none such is wanted. It seems a pity that building-laws should prevent such experiments being made, that they should compel in each town- or country-district one uniform mode of laying-out land for building, and that there should not be alternative methods suited to different requirements.

The provision of the last Building Act, that a space should be left behind each building proportioned to the length of its frontage, is proper and right in its intention to secure that a building shall have air and ventilation at the back as well as in front; but it is so drawn as to produce absurd results. A huge, high building of flats has an open space of about 3 feet wide behind it, one of 20-feet frontage need have only 200 feet of area behind, while one of 21 feet is compelled to have 300 feet. It seems to have been framed on the supposition that the officials who were to enforce it were incapable of doing a sum in arithmetic above the lowest School Board standard. Why the area behind should not simply have been proportioned to the length of frontage is a mystery perhaps clear to the mind of the late Metropolitan Board of Works.

A requirement of most Building Acts is that all new streets should be constructed for carriage traffic. There are many cases where this is not needed, as we see in

some old groups of workmen's houses, or in the new arrangement of some parts of the City, where alleys not more than 20 feet wide are paved only for foot traffic, giving greater cleanliness and quiet. In some towns in the North the building-laws insist on not only a street in front of the houses but a mews-lane at the back, both open to carriage traffic—producing dust, and increasing needlessly the quantity of space to be paved and kept clean, the mews-lane being always dismal and ugly.

The London regulation that all new streets shall be open at both ends to carriage traffic was no doubt prompted by the public inconvenience, which was felt on some of the great building-estates of London, of traffic across them being forbidden, and the streets closed by gates at the will of the ground-landlord.

The freedom and convenience of traffic is a fundamental public right, which ought to be secured when vacant land is built on. In London it has been singularly neglected, causing crowding and congestion of the traffic, making us lose our tempers and our time. There are only two continuous routes from the city westwards, the Strand and Oxford Street. North of it, though the streets are wide enough for traffic, they give no relief, for they have no continuity. Running, as a rule, north and south, they block the few disjointed streets which run westwards, which, had they been continuous, might have given relief. It is proposed to make a new underground railway under Oxford Street. It would be more to the public interest to make this, if possible, the occasion of a new route to the west.

It was probably this evil which was supposed to justify the astounding powers recently granted to the Metropolitan Board of Works, to compel owners of estates to lay them out as the Board might choose to dictate. The Metropolitan Railway was allowed to be made without a single route across it between Kensington High Street and Gloucester Road, and westward there is a block half a mile long without a single street running westward across it. But this evil is in no way remedied by compelling proprietors of isolated estates to run across them streets, which, though open to traffic, are useless for *general* traffic, being out of the line of it and leading nowhere. That the two routes we have actually serve, in some sort of way, for all the enormous traffic of London to the west, proves that there is no necessity, so far as traffic is concerned, for compelling every new street, though it never can be a traffic route, to be constructed as if it were. What is wanted is not despotic power over isolated estates, but general power to run continuous routes for traffic across different estates which lie in the necessary line. But this may, perhaps, best be provided, as at present, by a separate Act for each case. If proper and ample provision be made of continuous streets for the necessary lines of traffic, no public good is gained by making the intermediate streets which lead nowhere all open to public carriage traffic.

It is rather a boon, not only to the inhabitants, but to foot-passengers (for we cannot all always ride in carriages), to have now and then, as a change from the roar of the streets, quiet ways of smooth clean flags, where perhaps grind-organs might be forbidden. That such quiet havens, which used to be frequent, should now be everywhere ruthlessly suppressed is, I think, unreasonable, and serves no public good.

The late Board claimed the power to forbid the construction of a court of workmen's dwellings within a single gate. Happily they lost the case at law. But why should they want to prevent it? Why should we not be allowed, if we choose, to arrange our houses in a group like a cathedral-close or the quadrangle of a college?

There is now, I suppose there always was, a disposition in reformers and officials to make people square their lives and conduct by what the former deem for their good. Once it was the theologians who made the claim, and got the civil power to enforce it for them; now it is the doctors and sanitary people—in both cases, of course, only for our good. The theologians have resigned, and allow us to believe as we please, or at least attempt only moral suasion; but their mantle has fallen on the sanitary doctors. If these had their will, the civil power would see that we do exactly as they think we ought to do, the only drawback being that they are not themselves infallible.

At one time open drains were the heresy to be suppressed, now they are made as open as possible by blowholes into the street. For my part I should not care to live in Dr. Richardson's *Hygeia*, with its walls of glazed white bricks. In theology, in medicine, in sanitation, and in architecture, the principle holds good that no law should prevent us doing as we like, so long as we do not harm our neighbour or run a risk of it; that regulations and restrictions are evils, albeit necessary ones, preventing the freedom of natural development; that no restriction should continue, still less should be imposed, which cannot show clear necessity and reason.

One evil of restrictions is that they necessitate officials to work them and enforce them. Your true official does not reason, any more than does a foot-rule. He *is* a sort of foot-rule, his function to try whether two things tally. The most perfect official, it is said, never does anything that he can possibly help doing. Why should he trouble himself with being reasonable?

It is the good fortune of architecture here in London that the officials who look after it are not, in their nature, or in the first place, such. The District Surveyors of London are practising architects first, and only in the second place officials to enforce a law; and this, while it gives them a higher standing and authority, gives them also, from their practical experience of the working of the laws on their own works, a wider and more practical view of its requirements beyond the mere letter of it, and a sympathy with those they have to look after, whether architects or builders, which conduces to fulfilling the essential objects, not the mere letter of the law.

The various points and suggestions to which I have ventured to direct your consideration are perhaps specially worthy of attention at the present time, when the institution of County Councils will flood the country with new regulations, and new officials to enforce them.

There is a danger, I think, that the new bodies, in the zeal and enthusiasm and, perhaps, the over-confidence of youth, will proceed at once to frame regulations and restrictions out of their inner consciousness, or to copy those of London or some large town—needless in their case, and perhaps killing off the distinctive features in the modes of building remaining in the district. There is a danger that variety and individuality

may be crushed out. Let us hope that no new regulations will be enacted unless they are proved by experience to be necessary; that while cleanliness and health, sound building, and prevention of fire are seen to, it may be remembered that there may be different ways of promoting these, and that the legal enforcement of *some one method* prevents development and improvement.

It may possibly be thought presumption in one who has no practical experience in the administration of the Building Acts to venture, in the presence of many whose duty this is, criticisms on them and suggestions as to their amendment. But the fact that it has been their duty to enforce them tends to stifle any tendency to criticise them, while the experience of being under a law is perhaps a better school for learning its defects and how it hits, than administering it, though for any revision of the Acts their experience would be essential.

The result I would aim at is surely worth trying for—to make our towns more interesting and beautiful, to give them variety and individual character, making them a collection of buildings each with its own individuality, not, as they are too fast becoming, mere lines of uniform straight streets, without character, without sky-line; and, if it is possible, to give a new aim in laying-out our streets, looking not to the beauty of the plan, which can never be seen actually, but to the effect of the elevations of the buildings. If there are, besides, provisions in our building-laws which prevent the freedom and expansion of our architecture, it is to the interest, not only of our profession, but of the public, that they should be removed. However we may differ as to the methods of accomplishing this, I know I can claim your sympathy in the aims and objects I have been endeavouring to enforce.

J. J. STEVENSON.

* * The Discussion [see verbatim Report in JOURNAL OF PROCEEDINGS, Vol. V., pp. 205–12] of Mr. Stevenson's Paper was carried on by the President and the Hon. Secretary, Mr. C. Forster Hayward, F.S.A., Mr. E. C. Robins, F.S.A., Mr. Ralph Nevill, F.S.A., Mr. H. McLachlan, Mr. W. Woodward, Mr. E. T. Hall, Mr. Blashill, and Mr. Charles Fowler. A brief abstract of their remarks, and of the reply made by the author of the Paper, is here appended:—

MR. WATERHOUSE, R.A., *President*, considered the subject of the Paper most opportune, owing to the formation of the County Councils. With reference to St. Mary-le-Strand, it was not only that the church was beautiful in itself, but it had an advantage which very few metropolitan buildings had, that of being exactly in the right place.

MR. J. MACVICAR ANDERSON, *Hon. Secretary*, thought it might be of interest to state that a deputation had waited upon the Strand members of the London County Council to protest against any idea of the removal of the church, and he agreed with the President that never was a building erected so specially for its site as St. Mary-le-Strand.

MR. C. FORSTER HAYWARD, F.S.A., *Fellow*, endorsed the remarks of the President and the Hon. Secretary, and said one of the great principles with regard to new streets, ignored by those who advocated the removal of St. Mary-le-Strand, was that advantage should be taken of such monuments, and spaces arranged so as to enhance their beauty and improve their surroundings.

MR. E. C. ROBINS, F.S.A., *Fellow*, asked whether a northern road had been considered in connection with saving the church of St. Mary-le-Strand, as it was clear that such a road would very much add to the convenience of the traffic.

MR. RALPH NEVILL, F.S.A., *Fellow*, thought it most important that the advantage of crookedness in streets should be insisted upon. The great beauty of many streets was due to irregularity. He thought it extremely undesirable to carry out large improvements by little bits, instead of by comprehensive schemes of improvement which might repay the public.

MR. H. McLACHLAN, *Associate*, said if any one looked at a map of the United States the absurdity of dividing up large provinces by straight lines would be evident, and the streets exhibited the same principle. Several opportunities had recently been lost in London for laying out squares, circuses, &c., notably at Hyde Park Corner, the junction of Northumberland Avenue and Trafalgar Square, and Piccadilly Circus. An open space with a monument in the centre was as good for purposes of traffic, and far more artistic than cutting up, as described, into little islands.

MR. W. WOODWARD, *Associate*, thought at last the British public was beginning to recognise that the width of thoroughfares, the height of buildings, and the embellishment of open spaces were matters affecting the general health and well-being of the whole community. With regard to the question of open thoroughfares, he thought no streets should be closed in, as it did not tend to the healthiness of the dwellings. He claimed that it was through the movement of members of the Institute that the area at Piccadilly Circus, and also the triangular space in Bloomsbury Street, were not built upon, and that the thoroughfare from Holborn Town Hall to the Angel had been increased from fifty to sixty feet in width.

MR. E. T. HALL, *Fellow*, was of opinion that sometimes straight streets might be an element of the very greatest public beauty, mentioning the city of Turin as affording examples in its rectangular arrangement of streets. He thought the same principle might be applied with equal effect in many cities in England, although it would not apply with the same force to London. He presumed most streets owed their origin to some watercourse or path in times when there were no buildings, as, for instance, Lombard Street; but no one would say Lombard Street was beautiful because it was curved.

MR. THOMAS BLASHILL, *Member of Council*, thought all might in the main agree with what Mr. Stevenson had said; but he considered Paris was dear because so many people with money went there to spend it, and that the work done to the buildings was a consequence of the money so spent, and not the cause of the dearness. He also differed from Mr. Hall as to Turin being a beautiful city; in spite of the charm arising from the views of the distant mountains, he thought it the most monotonous city in Europe, chiefly owing to the straight streets. If one looked into the modern London improvements it would be seen that nearly every street was curved, though it might not always be the best curve conceivable. There was no difficulty in getting projections over the frontage line sanctioned, if they were reasonable. Mr. Nevill thought that, by taking a larger extent of land for improvements, a profit might be made; but if he would take a case, make an estimate of the value of the land with the buildings and the probable compensation for trades removed, and the estimated returns for vacant land, he would be fortunate if he saw his way out of the project with half the capital with which he went into it.

MR. CHARLES FOWLER, *Member of Council*, considered it would be well to be quite sure the profession agreed as to what was required with reference to the heights of buildings before asking the County Council, or any other authority, to lay down any rules—as there had been great difference of professional opinion when a new Act was proposed by the Metropolitan Board. He quite agreed that in laying-out streets for a purpose—to expose a building to view, or avoid a building of importance—there should be no hesitating because the street would be crooked; but he did not think a street should be made crooked solely with the view that it would thereby be more picturesque.

MR. J. J. STEVENSON, F.S.A., *Fellow*, in his reply, said Mr. Hall had referred to Turin as an example of what a fine thing straight streets were; but where you could not get streets with colonnades on each side, twenty-four feet wide, each with a snowy mountain at the end, he thought that to see the various buildings as one could in a curved street was an advantage. He was glad to hear Mr. Blashill say that permission for reasonable projections was not difficult to obtain. His experience, and that of others known to him, with the Metropolitan Board had been different.

LIX.

THE ROMAN THERMÆ. By GEORGE AITCHISON, A.R.A., Professor of Architecture at the Royal Academy, *Member of Council*.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

THE Roman Thermæ seemed to be a subject in which architects would take an interest, illustrating, as their very ruins do, the size and durability of Roman monuments, and even now showing traces of their former splendour. They exhibit some of the widest spans in vaulting ever executed, and certainly the largest dome. The subject, however, is so large that I have confined myself to a description of the exercises and the bathing carried on in them, and to a comparison of those measured by Palladio, which range over a period of nearly four hundred years. They have, too, a peculiar interest for Englishmen, as Richard Boyle, Earl of Burlington [1695–1753], the architect, was the first who published Palladio's drawings and restorations of them. Since Palladio's time the bulk of those Thermæ he measured, drew, and restored have been swept from the face of the earth.

Lord Burlington, who was a student of Palladio, came to the conclusion that Palladio's drawings of the Thermæ were still in existence, and searched through Italy for them. He was lucky enough to find them at the Palace of Masera, in the Trevigiana, which was built by Palladio for Daniel Barbaro, the Patriarch of Aquileia. In 1730 Lord Burlington published engravings in mezzo-tint of these drawings, the only missing plan being that of Agrippa's Thermæ. Tommaso Temanza, who published a Life of Palladio in 1762, had this plan of the back part, which was all that existed in Palladio's time, and allowed Charles Cameron (English architect) to publish it in his book, *Baths of the Romans*, in 1772; a second edition of this was published in 1775, also with an English and French text; subsequently the drawings were republished in 1785, by Octavio Bertotti Scamozzi, with a French text. The greater part were again published by Canina, with an Italian text, in his *Architettura Romana*, 1834.

In 1828 the great French architect, Abel Blouet, published his splendid monograph on those of Caracalla. In recent years Baron H. de Geymüller has published a mono-

graph on B. Peruzzi's sketches of the front part of Agrippa's Thermæ, on which Peruzzi was to build the Pitigliano Palace. In 1883 Count Nispi-Landi published a monograph on Agrippa's Thermæ; and I hear one on Diocletian's is now in course of publication by the French Government, the restoration being by M. Paulin.

A few plans of the Thermæ have been given in Alberti's and Serlio's works, and in some medical works on bathing, and there is an Essay on the Baths and Exercises of the Greeks and Romans in Guillaume du Choul's work on the Religion of the Ancient Romans, A.D. 1556. It is also stated that there are vast stores of drawings of them by Renaissance architects in the Vatican, the Barberini Palace, and the Uffizii at Florence; at Borgo-San-Sepolchro, Leyden, Berlin, and elsewhere. As far as I can learn, there are none at the British Museum nor in the Royal Library at Windsor.

It would be incumbent on any one professing to publish an exhaustive treatise on the Thermæ to consult all these unpublished drawings, and to read through every classic author from the days of Agrippa to Constantine the Great.

We know from Vitruvius that there were hot baths at Rome in his time; and, from Julius Cæsar leaving "three million pounds" weight of oil to the bathers, I should imagine that baths must then have been both numerous and well attended. It is also known from Vitruvius that the Greek Gymnasia, which he erroneously calls Palæstræ, were furnished with baths. His description is said to be taken from one at Naples. It would be superfluous to give Vitruvius's descriptions, as my audience are probably as well acquainted with Vitruvius as with their Prayer-Book.

I believe that those of Agrippa were the first Thermæ built at Rome. I have kept to the Latin name, though that only means "hot springs" or "hot baths," because these vast enclosures combined three main uses:—schools for teaching the citizens gymnastic, and I believe for teaching professional athletes as well; exercising grounds; and baths—and a great deal more.

There was generally a grand-stand stretching the whole length of the racecourse, some six hundred feet, to witness the foot-races and the other competitive athletic exercises. Usually there was an aqueduct to supply the water, and there were always tanks to heat it. There were walks shadowed by trees and adorned with seats and statues; halls for philosophers, rhetoricians, poets, and declaimers; and the interiors were resplendent with rare marbles, glass mosaic, encaustic painting, and gilding, and adorned with the masterpieces of Greek sculpture. In some cases shops or lodgings occupied a considerable portion of the enclosing building; the Gymnasia and the Baths mostly formed a central block, separated by the grounds from the buildings surrounding the enclosure.

Seats were provided for from 1,600 to 3,200 bathers; vast storehouses for wood, oil, and pitch; barracks for slaves, and possibly for the workmen who kept the place in repair—and these, I imagine, were mostly below ground. After the baths were kept open of a night, and illuminated, a still larger space was wanted for storing additional oil and lamps, and for cleaning and trimming them.

Roman gymnastic, like everything Roman, was taken direct from the Greeks; but,

like their architecture, it possibly underwent modifications [Plautus, *Bac.* iii. iii. 24; *Mostellaria*, i. ii. 67, 68]. The main athletic exercises practised by the Romans were running, leaping, dancing, and jumping, quoit- and javelin-throwing, wrestling, boxing, and the *pancratium*—a mixture of wrestling and boxing—ball-playing with four or five different sorts of balls, exercising, with dumb-bells and with sheets of lead on the shoulders, or in leaden-soled shoes, swinging, rope-climbing, bawling, fencing, cutting or thrusting at a quintain, and riding on horseback.

The Greeks undoubtedly exercised in the Coryceum with the *κώρυκος*; though its precise use is unknown, it is believed to have been a suspended leathern bag, filled with fig-seeds, olive-husks, bran, flour, or sand; but whether struck at, as our boxers strike at a sack of shavings, or swung against an opponent who swung it back, I do not know. The only use of the word "Coryceum" is by Vitruvius [lib. v. xi. 2]. I am, however, inclined to think that the practice continued only with a change of name, and that the *κώρυκος* was called *Follis pugilatorius*. Plautus says:—"I will turn you " into a boxer's bag, and will assault you hanging with blows [*Rud.* iii. iv. 16].

Ball-playing was the favourite exercise of the Romans. Galen, the physician, who lived in the time of the Antonines, had been the doctor to a school of gladiators in his native town, Pergamum, and had put his shoulder out while pursuing some of the exercises. He says, in his treatise on the little ball, that it is the safest and best exercise, safer even than bawling. The balls were:—the *Trigon* [Mart. iv. 19], a little hard ball stuffed with hair, and supposed to be called "trigon" because three played at it. This ball was generally played in a ring of players, who aimed at one, and threw at another; when it touched the ground it was removed, and, I presume, counted against the man who missed [Petronius, *Sat.* xxvii.]; though from Galen's description it seems as if there was a scramble for it on the ground. Secondly, the *Harpastum* [Mart. *Epigr.* iv. 19; vii. 31], a game unknown [Epictetus, ii. 5; Athenæus, i. 25; notes to Strabo, lib. v. iii. 8], though it was purely a man's game, as Martial objects to Philænis playing at it [Mart. vii. 66]. Thirdly, the game with the *Pila paganica* [Mart. xiv. 45; vii. 31], a ball stuffed with feathers, like our old golf-ball. Fourthly, the *Follis* [Mart. iv. 19]; there were possibly two of these, the small and the large one. The large one was a hollow leathern ball, like our football, and played as the Italians now play *Pallone*. The ball was struck by a guard on the fore-arm of the player, probably over a line dividing the two sets of players, and struck back by the adversary before it touched the ground. Fifthly, the other *Follis*, which I fancy was a smaller and much softer hand-ball; Martial speaks of its feather weight and softness [Mart. iv. 19; xiv. 47; vii. 31].

The athletes on entering were either oiled and sanded [Mart. vii. 66; Epictetus, iii. 15], or rubbed over with *ceroma* [Mart. iv. 4; vii. 31; xi. 48; Juv. vi. 246]—a mixture of clay, oil, and wax—before beginning their exercises.

It is believed that the young boys began their exercises before daybreak [Plautus, *Bacchid.* iii. iii. 22]; whether the schools were kept filled all day I know not, but it was customary to have finished exercising by the time the Baths opened [Mart. xiv. 163], if you wanted your water hot.

The whole of those parts that were devoted to the exercises, the athletes themselves, both amateur and professional, and those who frequented the Gymnasia and Palæstra, were presided over by the Gymnasiarch, called by Plautus [*Bacchid.* iii. 23] the Prefect of the Gymnasium. He was usually a magistrate, and had supreme control. He could forbid philosophers and others from attending, if he thought their doctrines were injurious to morals, particularly to the morals of the boys. There was the Xystarch, who looked after the professionals; the Gymnasta, or Gymnastes, called by Plautus "Magister exercitor" [*Trinummus*, ii. i. 4, and iv. 3. 9], who taught the exercises; Pædotribæ, undermasters, and the Hypopædotribæ; the Sphæristicus, who taught the games at ball; the Aliptes [*Juv.* vi. 422], the trainer who regulated the diet, regimen, and exercises of the athletes, and occasionally rubbed on the oil or *ceroma* [*Mart.* vii. 31; *Juv.* vi. 246], to see the state of their muscles; the Unctor [*Mart.* vii. 31], who oiled, and the Re-unctor who re-oiled, the athletes. The athletes were occasionally scourged when training for prizes, if the master thought it would do them good [*Epictetus*, iii. 15]. There was the Cosmetes, who arranged the games, registered the names, and kept order; under him was an Anticosmetes, and there were two Hypocosmetæ. There were Sophronistæ, to inspire a love of wisdom in the youth and look after their morals, and they were assisted in this task by Hyposophronistæ; and there were Mediastini, or drudges.

It is necessary to describe a part of the Greek Gymnasium, in order to see how much of it the Romans kept in the central building of their Thermæ. The Greek Gymnasium consisted of two peristyles, with cloisters surrounding them; and beyond these were spacious halls (*Exedra*), with seats for philosophers and men of science; these two courts were joined together.* In the Roman Thermæ the outside court, containing the Xysta and the plane-tree walks, was merely a part of the grounds; but the first court, with its buildings, was, with certain modifications, doubled and kept in the central building. This first court had a single portico or cloister on three sides, and a double one to the south, and these four porticoes had a periphery of two stadia, about 1,212 English feet. At the back of the double portico, and in the middle, was a hall, or exedra, with seats, called the Ephebeum—i.e. a school for teaching the recruits between 18 and 20 years of age their drill, military exercises, and athletics. To the right of this was the Coryceum; next it, the Conisterium, or dusting-room; and beyond this, in the turn of the portico, the cold bath. To the left of the Ephebeum was the Elæothesium, or oil-store and anointing place; next to this the Frigidarium—but whether this was an open space for cooling in, or contained a cold bath as well, I do not know; and from this was a passage to the Propnigeum, or furnace. In the turn of the portico, close to the Frigidarium, but towards the inside from its boundary, was the Concamerata Sudatio, or vaulted sweating-chamber, called by the Younger Pliny "Hypocauston," with the Laconicum at one end; in the turn of the portico and fronting the Laconicum was the Calda Lavatio, or hot bath. Vitruvius states that the use of

* The learned Newton, in his translation of Vitruvius, gives the best restoration extant.—G. A.

the Palæstra was not an Italian fashion, and therefore goes into particulars to inform his readers that he knew all about it.

Before leaving the exercises I must say something about the participation of the women in them. The favourite laudatory epitaph on a woman in the early days of the Republic was that "she stayed at home and spun wool;" but the women of the Empire were far from coveting such an epitaph. They were oiled and sanded [Mart. vii. 66], or rubbed over with ceroma [Juv. vi. 246-422], played at the *Harpastum* [Mart. vii. 66], used dumb-bells [Mart. vii. 66; Juv. vi. 421], ate *colliphia* [Mart. vii. 66], or biscuits of flour and cheese [Plaut. *Per.* i. iii. 12], kept their trainer [Juv. vi. 422; Mart. vii. 66], fenced [Juv. vi. 248], practised at the quintain [Juv. vi. 247, 267], and learnt the arts of the gladiator [Juv. vi. 252], even killed "boars [Juv. i. 23] and lions" [Mart. *Spec.* 6], and fought in the arena. I do not know whether the exercises of the women were carried on in the Gymnasia in company with the men, whether they merely took private lessons, or whether the women's Thermæ had Gymnasia devoted to this purpose. Supposing that Trajan's Thermæ were wholly for women, the two peristyles look very like Gymnasia, but, at least in Palladio's time, there was no grand-stand. I can well understand the astonishment and indignation of the men at this sudden transformation. It was like that of Balaam.

Plato, the advocate of women's rights, who, according to Epictetus [Epic. *Fragments*, 53], was studied by the women in Rome, had stimulated the hitherto dumb and submissive partner to assert her rights. Probably from their lack of education, they have not rivalled the Roman men in literature; but they certainly did rival them in the exhibition of courage, fortitude [Mart. i. 14], and daring.

The hot bath was an Italian fashion, and about that Vitruvius's information is almost nothing. He describes the aspect to be chosen, how to build the hanging-floor, a few details about the shape, lighting, and ventilation of the Laconicum, and the width of the floor bath; and states that the men and women's baths [lib. v. x. 1] should be close together, so that one set of boilers may do for both; but I defy any one to draw out a bath from his description. He merely mentions the warm and hot rooms, and says that the Laconicum and sweating-room are to be joined to the warm room. Fortunately, there exist the descriptions of Pliny the Younger, of Seneca, of Lucian, and of Polybius, the Baths at Pompeii, as well as remains or ruins of other Baths all over Europe, Asia, and North Africa.

One cannot help owing Vitruvius a grudge for not even dropping a hint about what would have been priceless; but had he not made his work into a pocket volume for the use of the nobility and gentry, the little information we now have would have been lost, and all that would have remained would be the extracts from his book in the Elder Pliny's *Natural History*. Pliny the Younger, in speaking of his Laurentine Villa, says [lib. ii. lit. 17]:—"Thence you enter into the grand and spacious "cooling-room (Cella Frigidaria) belonging to the baths, from the opposite walls of "which two round basins (Baptisteria) project, large enough to swim in. Contiguous "to this is the perfuming-room (Unctuarium), then the sweating-room (*Hypocauston*),

“and beyond that the furnace (*Propnigeon*), which conveys the heat to the baths; adjoining are two other little bathing-rooms, which are fitted up in an elegant rather than costly manner; annexed to this is a warm bath (*Calida Piscina*) of extraordinary workmanship, wherein one may swim and have a prospect at the same time of the sea. Not far from hence stands the tennis-court (*Sphæristerium*), which lies open to the warmth of the afternoon sun” [*Melmoth.*].

The bath at his Tuscan villa is not unlike the former [lib. v. lit. 6]:—“Hence you pass through a spacious and pleasant undressing-room (*Apodyterium*) into the cold bath-room (*Cella Frigidaria*), in which is a large gloomy bath (*Baptisterium*); but if you are disposed to swim more at large, or in warmer water, in the middle of the area is a wide basin (*Piscina*) for that purpose, and near it is a reservoir (*Puteus*), whence you may be supplied with cold water to brace yourself again, if you should perceive you are too much relaxed by the warm. Contiguous to the cold bath is one of a middling degree of heat (*Cella Media*), which enjoys the kindly warmth of the sun, but not so intensely as that of the hot bath (*Caldaria*), which projects farther. This last consists of three several divisions, each of different degrees of heat; the two former lie open to the full sun, the latter, though not so much exposed to its heat, receives an equal share of its light. Over the undressing-room (*Apodyterium*) is built the tennis-court (*Sphæristerium*), which, by means of different circles, admits of different kinds of games” [*Melmoth.*].

We in England, who are slaves to drugs, have very little idea of the importance attributed to exercises and bathing by the ancients, and I speak now of the gentle exercises only. To be carried in a litter, to read aloud, to hold one's breath, to walk naked in the sun after being oiled, to be oiled, to perspire, to be strigilled, to be oiled again, to bathe, to be strigilled again, and perfumed, were common remedies and prophylactics; and to the same end various sorts of bathing were adopted. Cold bathing after exercise was used by those who wished to preserve their vigour or their voice [Mart. xi. 48], by many as savouring of ancient and more virtuous times, and by Stoics; and it was also used as a cure, particularly after the liver-complaint of Augustus had been cured by the cold applications ordered by his physician Antonius Musa. This treatment was not, however, always crowned with success, as Marcellus is said to have perished through the cold-water cure. Celsus and Galen prescribed various sorts of bathing as treatment in a variety of diseases, and from Celsus [i. 4] it appears that it was permissible to go into the Tepidarium with the clothes on. The general methods adopted were much like those now in use in “Turkish baths.” Some went gradually from the cold through the warm to the hottest room, and some began with the hottest and gradually cooled down; but, either way, they finished with a cold plunge or douche [Pet. Sat. 28]. The tepid-, warm-, and hot-water baths seem to have been shallow, and a great deal of the bathing was done by pouring buckets of water of various temperatures over the bathers; the marble chairs which still remain have a large hole in the seats, to let the water run off. The bathers were mostly oiled on going in, apparently strigilled before the cold bath; and, after it, they were rubbed dry and per-

fumed, and the excess of oil or grease was rubbed off by linen or woollen towels [Pet. iii. 28, 91; Juv. iii. 263]. They were shaved, plucked, strigilled, pumiced, frizzed, and painted,* while in the bath; and some took refreshments there [Mart. xii. 19, 71]. Augustus says in his letter to Tiberius [Suetonius, *Augustus*, 76]:—"He ate but two mouthfuls when he was in the bath, an hour after nightfall, before he began to be oiled."

I do not think the Romans had any method of testing heat equivalent to the thermometer. In Republican days it was the business of the Ædile to try the heat of the water with his hand [Seneca, lit. 87]. From Seneca's description some of the hot water in the baths of his day was almost scalding; he says [lib. xiii. lit. 87], speaking of the heat of the water in Republican times:—"Not like that which has lately been used, as hot as fire, that is fit for washing alive a slave convicted of some wickedness." Besides the remarks of Seneca, one may imagine that the water was very hot, from the epigram of Hermippus given in Athenæus [*Deipnosophists*, Epit. lib. i. 32, Younge]:—

As to mischievous habits, if you ask my vote,
I say there are two common kinds of self-slaughter :
One, constantly pouring strong wine down your throat,
T'other, plunging in up to your throat in hot water.

Hot-air, hot-vapour, or hot-water baths were also used to help digestion and produce sobriety after a banquet, so that the host and guests might begin again, as in Trimalchio's feast [Pet. *Sat.* 73]. The Caldarium was apparently full of steam, as Vitruvius [v. x. 3] advises a double ceiling for it, to prevent the vapour from rotting the woodwork. The heat of the Laconicum seems to have been dry, as Martial [vi. 42] and Celsus [ii. 17] both call it dry heat, and the pavement was so hot as to be called burning [Pliny, lib. iii. lit. 14].

The wealthier took with them slaves, who carried their strigils [Pet. *Sat.* 91; Pet. *Sat.* 5; Persius *S.* 5], sponges, towels, oil-bottle [Juv. iii. 263; Mart. xiv. 51], and boxes of precious ointment. Pliny the Younger tells of Macedo having his slave with him in the bath [lib. iii. lit. 14]; and Pliny, in his *Natural History* [xxxiii. 12], speaking of gold-heeled or embroidered shoes, or gold anklets, says:—"Much more becomingly do we accord this distinction to our pages, and the adorned beauty of those youths has quite changed the features of our public baths."

The Thermæ used to be open at 2 P.M., the 8th hour [Mart. iv. 8]; then the bath-bell rang or the trumpet sounded, and the water was the hottest [Mart. xiv. 163]; though Martial says that the water was hot in Nero's Baths at twelve, yet during the reign of some of the Emperors the baths were open all day and all night. The price of entrance was a quadrans, about half a farthing [Hor. *S.* i. iii. 137; Juv. vi. 447]. In the Republic, about the days of the Third Punic War, both sexes bathed in common, and this was defended by Gaius Gracchus; but that it was not universal in later days may be judged of by Aulus Gellius's [x. 3] story of the Consul's wife at the baths of Teanum, and from

* Lucilius. *In Non.* 95, 16.—"Rador, subvellor, desquamor, pumicor, ornor, expilor, pingor."—G. A.

Vitruvius [v. x. 1.]. It, however, became the common custom during the Empire, and men and women bathed naked together [Mart. iii. 72; vii. 34]; for the women then to wear even a pair of bathing-drawers was looked on as mock modesty, and laid them open to savage lampoons [Mart. iii. 87]. This custom was tried to be abolished by Trajan, Hadrian, Marcus Aurelius, and Severus Alexander, but apparently without much effect, seeing that Cyprian thundered against it.*

Boys under fourteen [Juv. ii. 152] and strangers were admitted free; about half a farthing (quadrans) was charged for men up to the tenth hour, when Martial says he was asked 100 [Mart. x. 70]; but what the women paid I do not know. Juvenal [Sat. vi. 447] makes this distinction between them:—"if you are going to be men, you must sacrifice a pig to Sylvanus, and be washed for a quadrans."

The bath servants were the

<i>Janitor</i> , or <i>Ostiarus</i>	.	.	.	The hall porter (from the latter name comes our word "usher," probably through the Italian "usciera," and the French "huissier").
<i>Balneator</i>	}	.	.	Bath master or mistress. The bath master must have done more than take the money, as Martial calls him [iii. 7] the drenched bath master.
<i>Balneatrix</i>				
<i>Capsarius</i>	.	.	.	Care-taker of clothes.
<i>Uuctor</i>	.	.	.	The oiler.
<i>Re-uctor</i>	.	.	.	Who re-oiled or perfumed.
<i>Tractator</i>	}	.	.	Shampooer.
<i>Tractatrix</i>				
<i>Tonsor</i>	}	.	.	Barber and hair-dresser, who cut the nails as well.
<i>Tonstrix</i>				
<i>Alipilus</i>	.	.	.	The plucker.
<i>Ustricula</i>	.	.	.	The singe-er.
<i>Fornicator</i>	.	.	.	The stoker.

And there must have been a whole army of slaves of various sorts to keep the baths clean, as well as turncocks, carriers of wood and pitch, gardeners, under-gardeners, and eventually lamp-cleaners and lamp-lighters, besides workmen for ordinary repairs.

I will now take the Thermæ in the order of time, describing those of Agrippa first, built about 27 B.C. I have already gone through the exercises, and the usual methods of bathing, and will now, with the plans [Illustn. xvii.], try to see to what purpose each portion of the upper structure is likely to have been put.

On either side is a peristyle, which answers to that described by Vitruvius in his Greek Palæstra, with the Ephebeum and its two side halls forming one half in depth of the double portico.

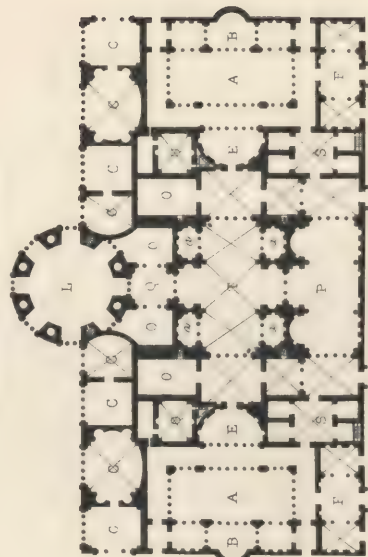
* Martial, 43-104 A.D.; Cyprian, 200-258 A.D.—G. A.





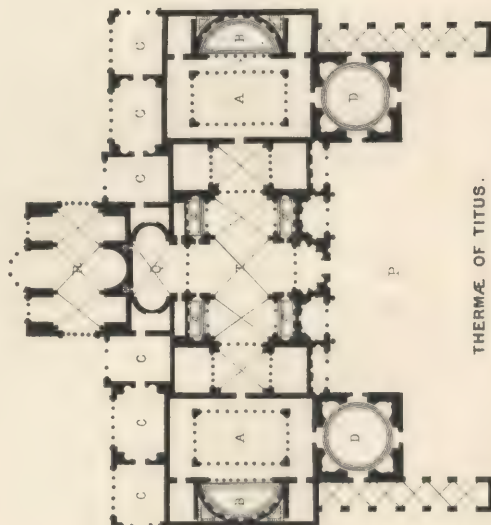
THERMÆ OF TRAJAN.

THERMÆ OF CARACALLA.

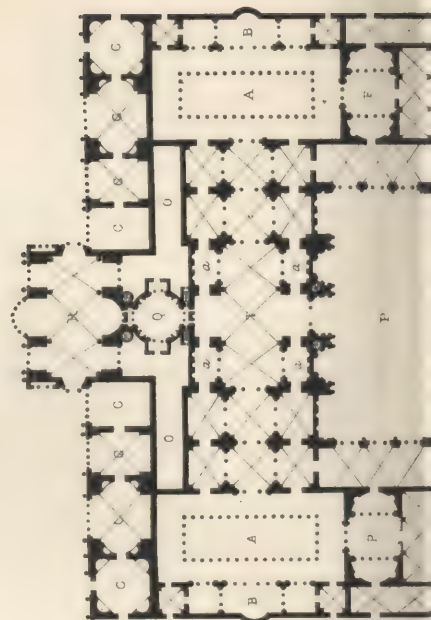


- A. A. PERISTYLES
 B. B. EPHEBEA.
 C. C. BATHS OF THE ATHLETES.
 D. D. LACONICA OF THE ATHLETES.
 E. E. EXEDRÆ.
 F. F. APODYTERIA.

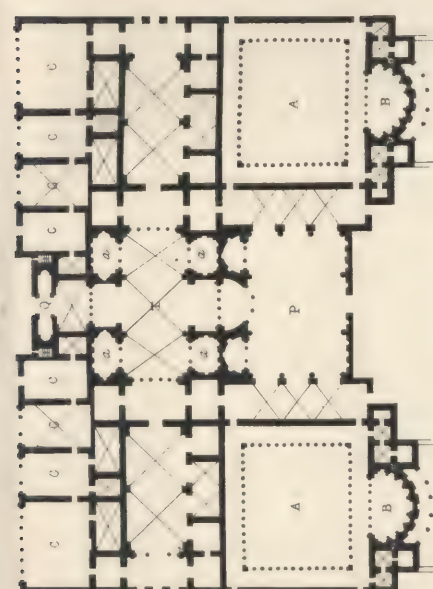
GYMNASIA OR PALESTRÆ



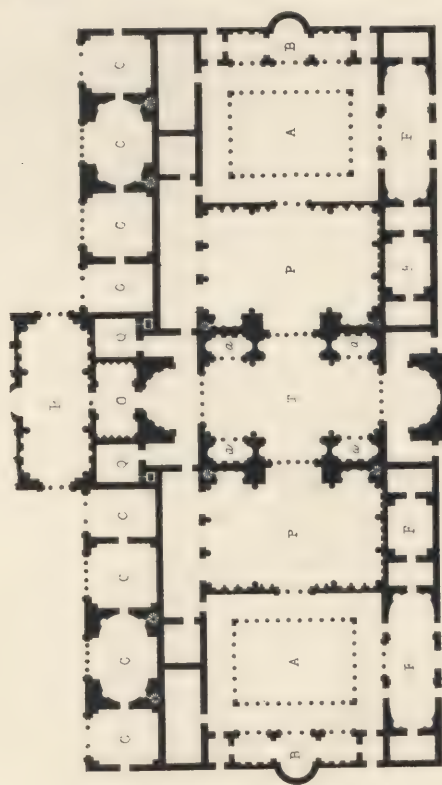
THERMÆ OF TITUS.



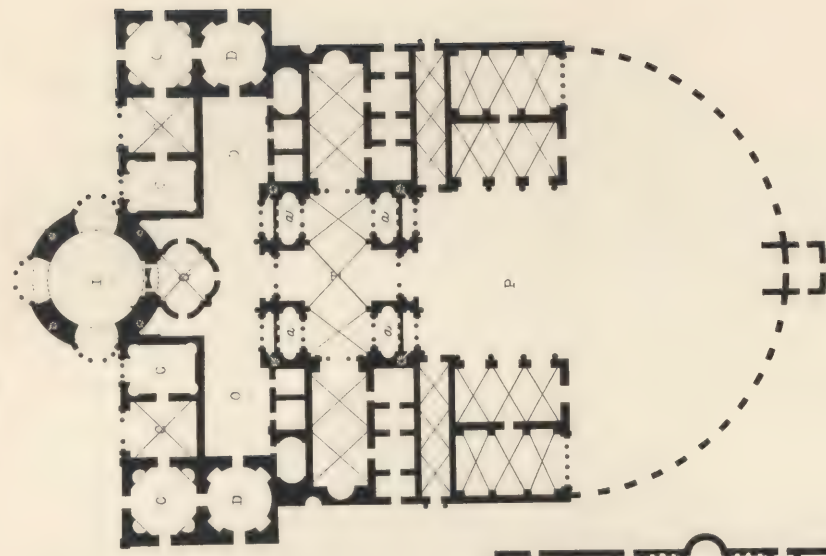
THERMÆ OF DIOCLETIAN



THERMÆ OF NERO.



THERMÆ OF AGRIPPA.
Upper part only.



THERMÆ OF CONSTANTINE.

L. L. LACONICA. O. O. OPEN COURTS AND PREFURNIA.
P. P. PISCINÆ. Q. Q. CALDÆ LAVATIONES.
T. T. TEPIDARIA. R. R. CONCAMERATÆ SUDATIONES.
BATHS (a. a. ALVEI OR FLOOR-BATHS. S. S. APODYTERIA.

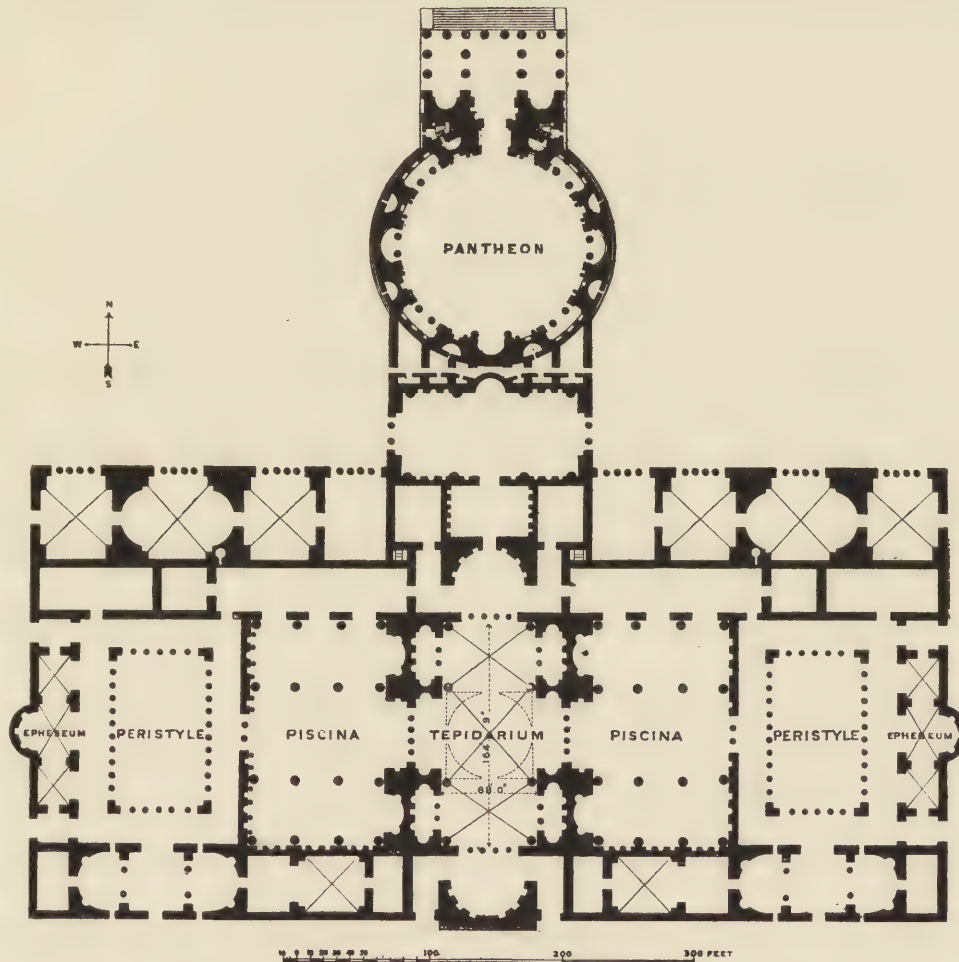
THE ROMAN THERMÆ [TO A UNIFORM SCALE OF ABOUT 200 FEET TO AN INCH.]

MEASURED BY PALLADIO AND PUBLISHED BY THE EARL OF BURLINGTON, 1730.

See Page 112.



If the Romans did not use the Coryceum, the rooms to the left and right of the Ephebeum may have been the Elæothesium and Conisterium, or they may have been merely extensions of the Ephebeum itself; on either side of these are flank entrances to the Gymnasium. Fronting each of the peristyles is an oblong hall, with semicircular ends, communicating at one end with a single room, and at the other with three. These oblong halls are evidently front entrances to the Gymnasia; the one room may have been the porter's lodge, and the other three undressing-rooms. At the other



PLAN OF THE THERMÆ OF AGRIPPA (showing the Pantheon as part of the building).

[See also Illustration xvii.]

end of the peristyle are two rooms, possibly the Elæothesium and Conisterium—if the halls to the right and left of the Ephebeum were not thus used—or the attendants' rooms; they may even have been two of the baths, though I believe they were not. And next, the last, there is a doorway into the end portico of the Piscina; from the peristyle opposite the Ephebeum is an opening into the Piscina. The water in these Piscinæ was probably cold, and therefore the cold bath of the Gymnasium may possibly

have been dispensed with. I think there is no doubt about it being the Piscina, as Palladio shows it open, though without the four internal columns, which were taken from B. Peruzzi's plan.

To return to the front, there are two entrances into the Tepidarium, on either side of the hemicycle. This vast hall cannot possibly be mistaken for any other room, because, besides its size, it has the four enormous piers to abut the vault, and the two recesses for the floor baths (*alvei*) at each end. The middle bay forms shallow transepts, going up to the screen of columns to the Piscinæ. This arrangement of the Tepidarium is found in every one of the Thermæ, from this to Constantine's. At Caracalla's some of the floor baths still exist, with the spout (*epistomium*) for the supply of water, and the exit for the water in the bottom, opposite.

These hemicycles at each end may have been the cooling-rooms, from which one could get into the open air at the entrance, and into the porticoes of the Piscinæ at the upper end, or the halls for philosophers. In the centre of the upper hemicycle is an entrance into an oblong court, for Palladio shows it open, with a smaller chamber on either side.

This open court leads into an enormous hall, the part next the Pantheon being still in existence; and beyond the apse is the Pantheon, but separated from it by a passage. The two rooms were possibly two *Concamerate Sudationes*, and the big one the *Calda Lavatio*, or *vice versâ*. One naturally asks, was the Pantheon originally built for the Laconicum; and if not, what was it built for? It certainly was not an entrance vestibule, for one would have gone from it into the hottest room. The first time an architect, who has read Vitruvius, enters it, its resemblance to the Laconicum must strike him, and he naturally says to himself:—"Over the eye was once the brazen "shield." The Pantheon has a family likeness to the Laconicum of Caracalla's, even to that of Constantine's Thermæ. Professor Middleton, who saw part of the floor excavated, said it is without a hanging-floor, that there was nothing but the drain from the gulley under the eye; but—unless my memory deceives me—I have somewhere read of the vertical flue-pipes being found in those recesses, which are now chapels.

The four rooms on either side of the back front alone remain to be considered. These were entered from the grounds only, but communicated with one another. I spoke of the Gymnasium being divided into two when adopted in the Thermæ, one half being retained in the main building, and the other half (the *Xysta*) being relegated to the grounds. I believe these four rooms on either side to have been those baths that belonged to the Gymnasium—viz. the cold bath, the cold room, the hot bath, and the sweating-chamber. What is supposed to be the cold room is of curious shape—i.e. an oblong, with two small breaks and two apses—and Palladio shows it groined. At Caracalla's there is no vestige of groining. These massive corners were not put for nothing, though I do not see what they were put for, unless it was groined. This form, more or less modified, perpetually recurs. There is only one more point I have to draw attention to here—a Laconicum, dotted [see preceding page], in the middle of the warm room. Baron H. de Geymüller thinks that the plan of B. Peruzzi

which extends to this point suggests it. Canina and Count Nispi-Landi have adopted it. Canina unfortunately is not to be depended on, and the latter follows his plan. The erection of this, of which there were no traces in Palladio's time, would have utterly spoiled the appearance of the magnificent Tepidarium, 164 feet long, 68 feet wide, and about 91 feet high, and rendered it too small to be of use. I must mention, however, that Serlio, in his plan of what he calls the *Thermæ* of Titus, but which resembles Constantine's, shows the centre of the Tepidarium as a *Laconicum*, and the swimming-bath as a circular hall [Serlio, A.D. 1544-51, p. 92]. The slave barracks and furnaces were probably under the main part of the building; this upper half was 614 feet long by 318 feet deep, exclusive of the large hall and the Pantheon. Very little is known about the lower half. B. Peruzzi's plan of the ruins of the front part, taken when he was about to build the Pitigliano Palace, shows only a few remains beyond the *Laconicum*. Canina was not to be deterred from restoration because the existing remains were inconsistent with his solution; but I want to lead, not to mislead. Given a plan, and the names of the possible rooms, it is easy enough to put the names on the rooms as you please; but if eventually more is known, the student who consults the work scarcely blesses the author for his fraudulent impudence.

Professor Middleton, who saw a portion of this front part excavated, found the stamp of Septimius Severus on some of the bricks: therefore the part where these bricks were found was not built before that date. I think the less I say about this lower half the better, as it would only be hazarding conjectures, since no ancient treatise on the *Thermæ* is extant. If Palladio wrote the text to his drawings, it was not found with them, and has not been heard of since.

The next *Thermæ* in time are those of Nero [reign from 54 to 68 A.D.], close beside Agrippa's, and the most magnificent that had then been built. Martial says:—

Who could be worse than Nero?

What better than his baths?—[Mart. vii. 33.]

Nero was a great admirer of everything Greek, and a great patron of the "fancy"; he brought sea water, as well as the *Aqua Solfatara*, to his Baths; Seneca's diatribes against the magnificence and luxuriousness of baths are supposed to have been directed against these and the baths of Etruscus. Nero seems to have borne very patiently the diatribes of this pretended philosopher, who was a little his step-father, and a perfect convert to the maxim—

It is not what we do, but say

In love and preaching that should sway—

and did not have him knocked on the head till it was suggested that he should be made Emperor.

The alterations in Nero's *Thermæ* from those of Agrippa are these: the two swimming-baths are made into one in the front, the *Ephebeum* was converted into a large apse, the Tepidarium was enormously increased in length, by a vast vaulted hall, with a shallow portico being added at each end; and on one side of these subsidiary

halls were some small chambers, possibly for the sea and sulphur baths. Beyond the transept of the Tepidarium was a small hall, then a long narrow room with rounded ends, and beyond a T-shaped hall, answering to the hall at the back of the Pantheon; but there is no circular Laconicum. The four rooms on each side of this hall are mainly got at from the grounds, as at Agrippa's, though there is an entrance from them to the shallow portico at the end of the Tepidarium; the rooms, however, are all rectangular, with small rooms behind them, possibly baths, dressing-rooms, or slave's rooms.

The next are the Thermæ of Titus [reign from 79 to 81 A.D.], of which the two Exedrae alone remain above ground; but much of the substructure exists, including parts of Nero's Golden House. They resemble Nero's very closely if the prolongations of the Tepidarium are cut off, only the Gymnasia have been pushed back so that they are central with the Tepidarium, the long narrow chamber beyond the transept has been made much wider, and there are only three instead of the usual four chambers on either side of the back front, and the projecting building in the middle is like a small Tepidarium. The great peculiarities of these Thermæ are the two long arcades going from the wall of the Ephebeum to within about 33 feet of the enclosure of the grounds, and a square building that stands in front of each Gymnasium, one of whose walls forms about half the side of each portico; each of these square buildings contains a circular chamber nearly 82 feet in diameter. Professor Middleton believes them to have been Laconica, as he saw the hanging-floors when the farmer who rented the land was planting vines; so that it would seem that the old sweating-room of the Gymnasium, spoken of by Vitruvius, was made into a regular Laconicum, and moved from the back to the front, suggesting that in the days of Titus the favourite plan of the athletes was to go at once from their exercises into the Laconicum, and finish off by plunging into the cold swimming-bath.

Corsi states that one hall in these Thermæ was paved with *lapis lazuli*, but unfortunately he does not say which one. Close to this is another Bath, approached only from the back, called by Palladio the Thermæ of Vespasian [reign from 69 to 79 A.D.], by Cameron Domitian's [reign from 81 to 96 A.D.], and by other writers Trajan's [reign from 98 to 117 A.D.]—supposed by Professor Middleton to have been for women only. A few of the Emperors and some of the Fathers of the Church did not approve of promiscuous bathing. It would be still more interesting than it is if it were known for certain that these Thermæ were wholly devoted to women. The building certainly had another storey for public use, above or below, on account of the number of grand staircases. Apparently there was no large swimming-bath on the ground-floor, and no grand-stand like that at Titus's, and there were but three instead of the usual four rooms on either side of the back front.

Next come those that Ælius Spartianus describes as "the exquisite Baths of Antoninus Caracalla" [reign from 211 to 217 A.D.], the fierce son of Septimius Severus. The Tepidarium [Illustn. xviii.] is about 180 feet long, 79 feet wide, and 108 feet high. The solar cell of these Thermæ was a marvel in the writer's day, but which was the solar cell was only settled by Professor Lanciani in 1873. It was the swimming-

bath (Piscina), and the flat roof was carried by T-iron girders. The carrying a flat terrace, 180 feet long, with a span of 76 feet, probably about two feet deep, would not be so very easy to construct, even in this iron age. The colossal ruins that are still standing after 1,700 years, that have braved the attacks of the Barbarians, neglect, earthquake, and wilful destruction, still awe by their magnitude, and excite imagination to picture the greatness of a people who, even in their decay, could venture on works of such magnitude and splendour.*

Although the plan of Caracalla's Thermæ is pretty, that of Agrippa's bears the palm. The two giant apses in Agrippa's looking down the Tepidarium, instead of into the Gymnasia, must have had a more splendid effect. Great planners attain all that is wanted by simplicity: witness Sir C. Barry's and M. Garnier's plans. In the plan of Caracalla's one recognises every feature in Agrippa's, only here again the twin Piscinæ are made into one in front; the grand Laconicum was but the Pantheon on a small scale. I give the plan of the Laconicum I measured on the spot [Illustn. xix.]: the central block is about 716 by 367 feet, and beyond this more than half of the Laconicum projects, which is about 164 feet in diameter. Olympiodorus says there were polished marble seats for 1,600 bathers. Palladio shows the oval halls of the back front groined, but at present there is no trace of vaulting except in the heads of the apses. In the heads of the four niches of these apses there are earthenware pipes of about 9 inches diameter, and one cannot help asking if they were to supply those cascades which fall over steps, still to be seen in the Mussulman houses of the East, and at which Seneca was so indignant [lib. xiii. lit. 87]:—"What a mass of waters murmuring over steps." The whole circuit of the enclosure is nearly a mile in length, the front taken up with two tiers of shops or lodgings between the grand staircases.

Professor Middleton believes that these cells were not baths, as Blouet showed them, as there were no service- nor waste-pipes. At the back is the grand-stand, with the Stadium in front, a Gymnasium or a Palæstra on each side, with halls and chambers. The flanks had two enormous flat apses, also containing a Gymnasium or Palæstra, two halls, and smaller chambers, a cloister, and an open walk; there were, too, on the sides other halls and staircases, as well as a continuation of the lodgings. At the back of the grand-stand (*theatridium*) there were sixty-four tanks for heating the water, two in depth, and two storeys high, each tank being 49 feet 6 inches long, 27 feet 6 inches wide, and 30 feet high, fed by an aqueduct; and below them were the furnaces. The vast storehouses and the barracks for slaves extended under part of the grounds, if not under the whole, as well as under the greater part of the central building. Viollet-le-Duc's estimate of the cost being thirteen millions sterling appears to be inadequate, if the cost of glazing and of glass mosaic in those days, and the cost of

* A black and white reproduction of the late Professor Cockerell's sepia drawing of the Tepidarium of Caracalla's Baths (preserved in the Royal Academy) appeared in *The Builder*, 23rd March 1889, by permission of the Academy Council. The view published in Illustn. xviii. [pp. 120-21] is reduced from the original negative taken by the authorities of that Journal, and it appears here by their permission. The drawing and others by Professor Cockerell are in the Architectural School.

importing marbles from Thessaly, the Ionian Islands, Phrygia, Tunis, Algiers, and the Red Sea, be considered. Gwilt gives the ratio of support to area as $\cdot 176$, while Notre-Dame at Paris, which has scarcely any internal walls, and whose vault is a mere shell, is $\cdot 140$, and at S. Peter's it is $\cdot 261$. The sight of these Thermæ alone may excuse the exaggeration of Ammianus Marcellinus, who said that Constantine found the Baths at Rome as big as provinces [lib. xvi. cap. 10].

The Thermæ of Diocletian (reign from 284 to 305 A.D.) were the largest erected in Rome, the central building containing baths for 3,200 bathers; a part of the Tepidarium, the Piscina, and the Laconicum now form the church of Santa-Maria-degli-Angeli. The enclosure contained many semicircular, segmental, and rectangular Exedrae, two Gymnasia or Palæstræ, and two circular halls, as well as the enormous grand-stand in front of which once stood a large column. The site of the grand-stand is now the Piazza-dei-Termini, in which the Via-Nazionale terminates; so those who have seen Rome lately can judge of its vastness. As regards the central building, it bears a close resemblance to the other Thermæ, except that in the Gymnasia the peristyles are complete—*i.e.* go completely round—and are not stopped against the Ephebeum, as at Caracalla's, though its periphery on the centre line of the cloister is but 740 feet, instead of 1,212. The oval halls in front of the Gymnasia are wider in proportion to their length than those at Agrippa's, and have a hall in front; and these Thermæ are otherwise noticeable by the great prolongation of the Tepidarium at both ends; the bronze bosses for the lamps still remain on the vault of the Tepidarium. The Ulpian Library was removed to these Thermæ; but where it was housed is not known, and the *æs thermarum*, or bath-bell, was found amongst the ruins. The Tepidarium is nearly 80 feet span, and 193 feet 6 inches long; and its columns are monoliths of red granite from Syene, about 4 feet 9 inches diameter above the present bases. The floor has been raised some six or seven feet, so that the hall looks rather squat.

Professor Middleton has published some sketches of Ligorio's [A.D. 1570], now in the Bodleian Library, showing a vast reservoir of the shape of the frustum of a triangle, 306 feet long, then close by the Baths of Diocletian. Serlio [p. 99] gives an imperfect plan and description of it.

I may add that the proportion of supports to area in the Thermæ of Diocletian is given by Gwilt as $\cdot 167$, consequently the art of construction had progressed between 217 and 284 A.D.

The last Thermæ given by Palladio are those of Constantine [reign from 306 to 337 A.D.]; the Tepidarium bears a strong resemblance to that of Nero's. The circular Laconicum, which is similar to those of Agrippa's and Caracalla's, again makes its appearance, but the old form of the Gymnasium has disappeared. There is a cryptoporticus, and there is a hall in its place with two long vaulted chambers at the back, each about 100 feet long and 23 feet wide—I have not the faintest notion what they were used for. At the back there are the four baths of the athletes, on either side of the Laconicum, but only three chambers are in a line; the separate or small Laconica stand at the back. These communicate with an open court, once cut in two by the

Cella Media, or the Calda Lavatio, which once connected the Cella in front of the Laconicum with the Tepidarium. At the back of each of these two courts are three small halls and a shallow portico; in front the two halls on either side of the Piscina are joined by an arcade, semicircular on plan. In the grounds at the back is a semi-circular grand-stand. If these Thermæ ever had an enclosure surrounding the grounds, it had perished before Palladio's time. I mentioned before the curious plan of it which Serlio gives under the name of Thermæ Titus.

From the fact of the few ruins of the Thermæ that remain presenting nothing to the eye but bare brickwork or rough rubble, one is too apt to forget how gorgeous were their interiors in the full tide of Roman magnificence; with the exception of Nero's Golden House, no buildings were so splendidly finished. Agrippa's Thermæ alone were without that most gorgeous of all decorations, glass mosaic; Pliny the Elder [*Nat. Hist.* xxxvi. 64] states that it was not used there because it was not then invented, so its place had to be supplied by encaustic painting; but, at any rate, in subsequent Thermæ the walls were lined with coloured and polished marbles, and the vaults with glass mosaic—for the Romans had a passion for beautiful colour. Martial [43–104 A.D.], Statius [61–96 A.D.], and Seneca [2–65 A.D.] give some idea of the costly magnificence of the Thermæ; St. Mark's at Venice can but give a faint idea of their splendour. Every part of the then known world was ransacked for choice marbles; and, if report be true, one of the marbles came from India, though the desire for this marble must have been due rather to its rarity and costliness than to any great intrinsic beauty it possessed. Whether stained glass added its effulgence I know not, the general belief being that it was not used for glazing till Justinian's time. The larger columns in the Thermæ were mostly of granite, for the Romans very properly affected monoliths; but those of secondary size were certainly of red porphyry, of *cipollino*, of *pavonazzetto*, of *giallo antico*, of grey and of white marble; and when it was possible to find sound marble long enough, no marble was too rare or too costly to be used. St. Mark's, built up as it was from the spoils of every temple, palace, bath, or monument that lay close to the shores of the Mediterranean, presents an affluence of specimens. Red porphyry and *verde antico* are quite common, and that column by the door of "grand antique" (angular fragments of black in a white paste) has a ring brilliantly polished by the shoulders of the faithful, else one would scarcely know of what marble it was; there are, too, columns of *semesanto*, and of the *breccia di Sette Basi*, and it is believed that the nave columns are mainly of proconnesian marble taken from the Palace of Mausolus at Halicarnassus.

To return to the Baths, Seneca says every bather of his day "would consider
 " himself poor and wretched unless the walls shone with large and precious roundels,
 " unless the Oriental alabaster was enriched with inlays of Numidian marble, unless
 " on every side laborious and varied painting like a picture did not border them, unless
 " the chamber was overlaid with glass, unless Thasian marble, formerly a rare sight
 " in any temple, lined our swimming-baths, in which we cast our bodies exhausted

“ with much sweating, unless spouts of silver pour out the water !—And as yet I am speaking of plebeian pipes. What will it be when I come to the baths of the freed-men ! How many statues, how many columns carrying nothing, but placed as ornament for the sake of the cost ! How much water murmuring over steps ! To such a pitch of delicacy have we arrived that we are unwilling to tread except on gems. In this bath of Scipio’s, narrow slits rather than windows are cut through the stone wall, that they may admit light without injury to the fortress ; but now they call such baths blackbeetle traps if they are not so fitted that they can receive through the largest windows the sunlight of the whole day, unless the bathers can be washed and bronzed at the same time, unless from the basins they can see the landscape and the sea.”

Martial [vi. 42] speaks of the Baths of Etruscus being lined with green porphyry, *giallo antico*, onyx, serpentine, and Parian marble. Statius says that “ its purple walls of Synnadic marble were enriched with the golden Numidian, that its gables were effulgent with glass mosaic, and that the very water was so happy in going through silver pipes into silver basins, that it would not run away.”

That Seneca’s remark of walking on gems was not exaggerated, is known from the finding of a pavement of *lapis lazuli* at the Baths of Titus ; so that I can scarcely imagine any buildings more sumptuously finished, adorned too, as they all were, with the masterpieces of the Greek sculptors and statuaries, fitted with chairs of carved and polished white marble, with casements of gilded or burnished bronze filled with glass ; probably the outer doors only were of bronze, and the other doorways had curtains of rich brocades, embroidered and fringed with gold. The troops of pages, black, brown, olive-coloured, and white, in gorgeous raiment, with jewelled ear-rings and belts, with gold bracelets and anklets, holding white and purple sponges, polished strigils, coloured glass oil-bottles, onyx vases of perfume, and embroidered towels, amongst the plashing fountains and murmuring cascades, must have made a scene of enchantment ; and it must have been even more splendid and mysterious when the baths were illuminated at night.

GEORGE AITCHISON.

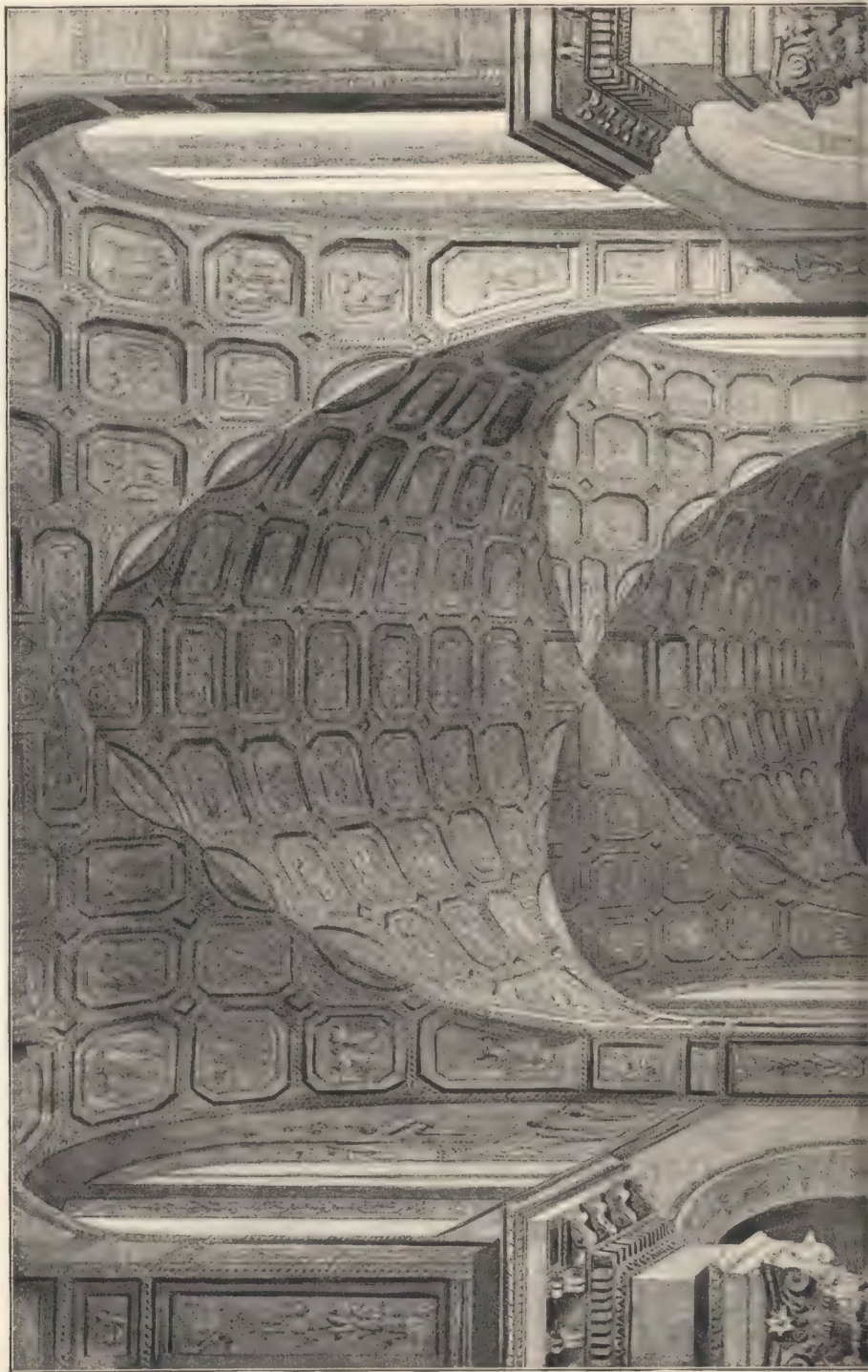
* * The Discussion [see verbatim report in JOURNAL OF PROCEEDINGS, Vol. V., pp. 279–83] of Professor Aitchison’s Paper was carried on by Mr. Arthur Cates, Mr. A. S. Murray (of the British Museum), Mr. Alexander Payne, Mr. R. L. Cole, the Rev. C. L. Acland, M.A., of Colchester, and Mr. Waterhouse, R.A. A brief abstract of their remarks, and of the reply made by the author of the Paper, is here appended :—

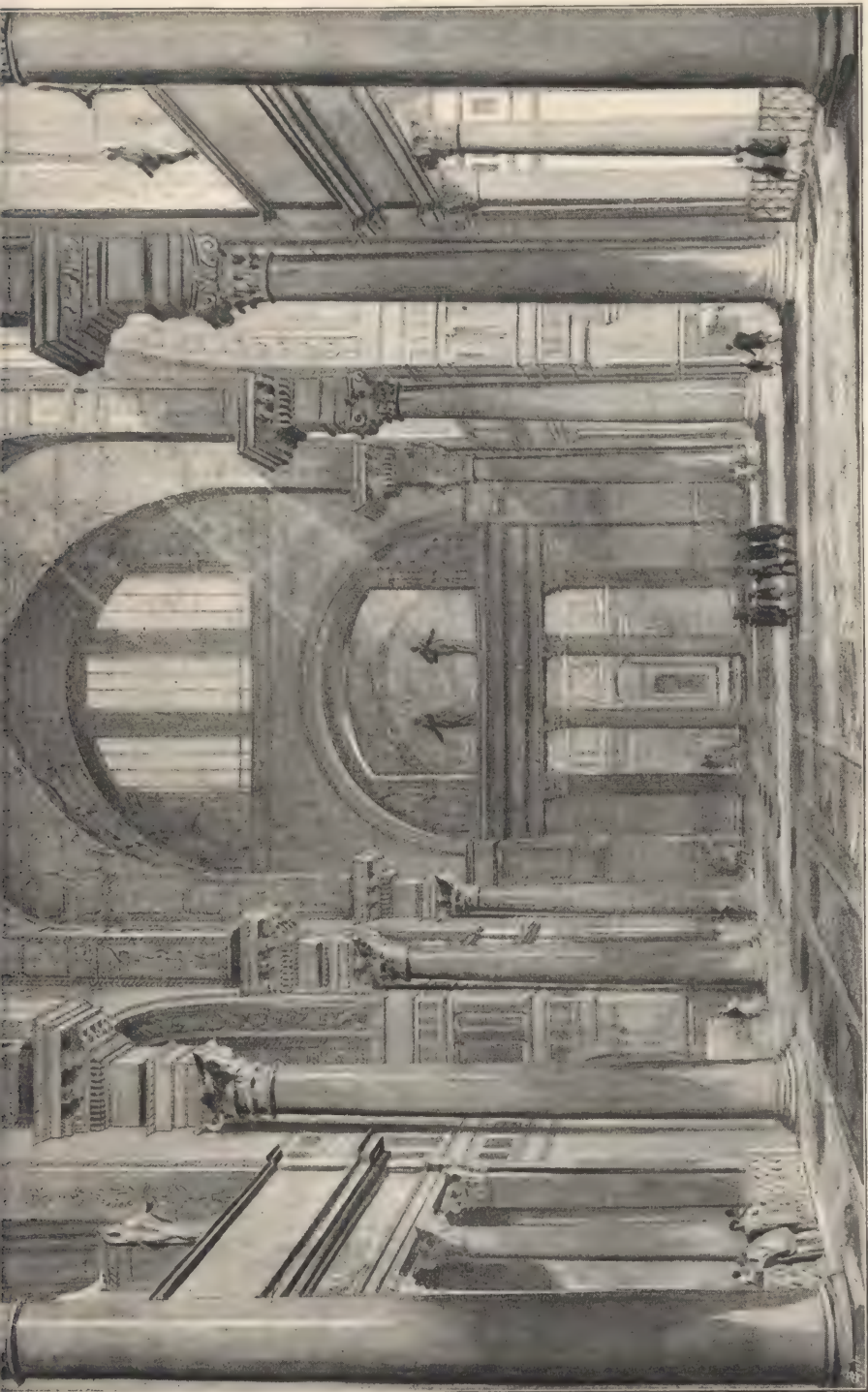
MR. ARTHUR CATES, *Vice-President*, said that the subject required close study in order to appreciate the differences which had arisen between antiquarians as to the appropriation of these baths. He had always regarded the theory that the Pantheon was a vestibule to the Baths of Agrippa as entirely untenable, and could not think, from its position and plan, and from the other arrangements of the Roman Baths, that it ever formed a part of such buildings. It was to be regretted that in our



TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. V. NEW SERIES.

LIX. THE ROMAN THERMÆ (xviii).





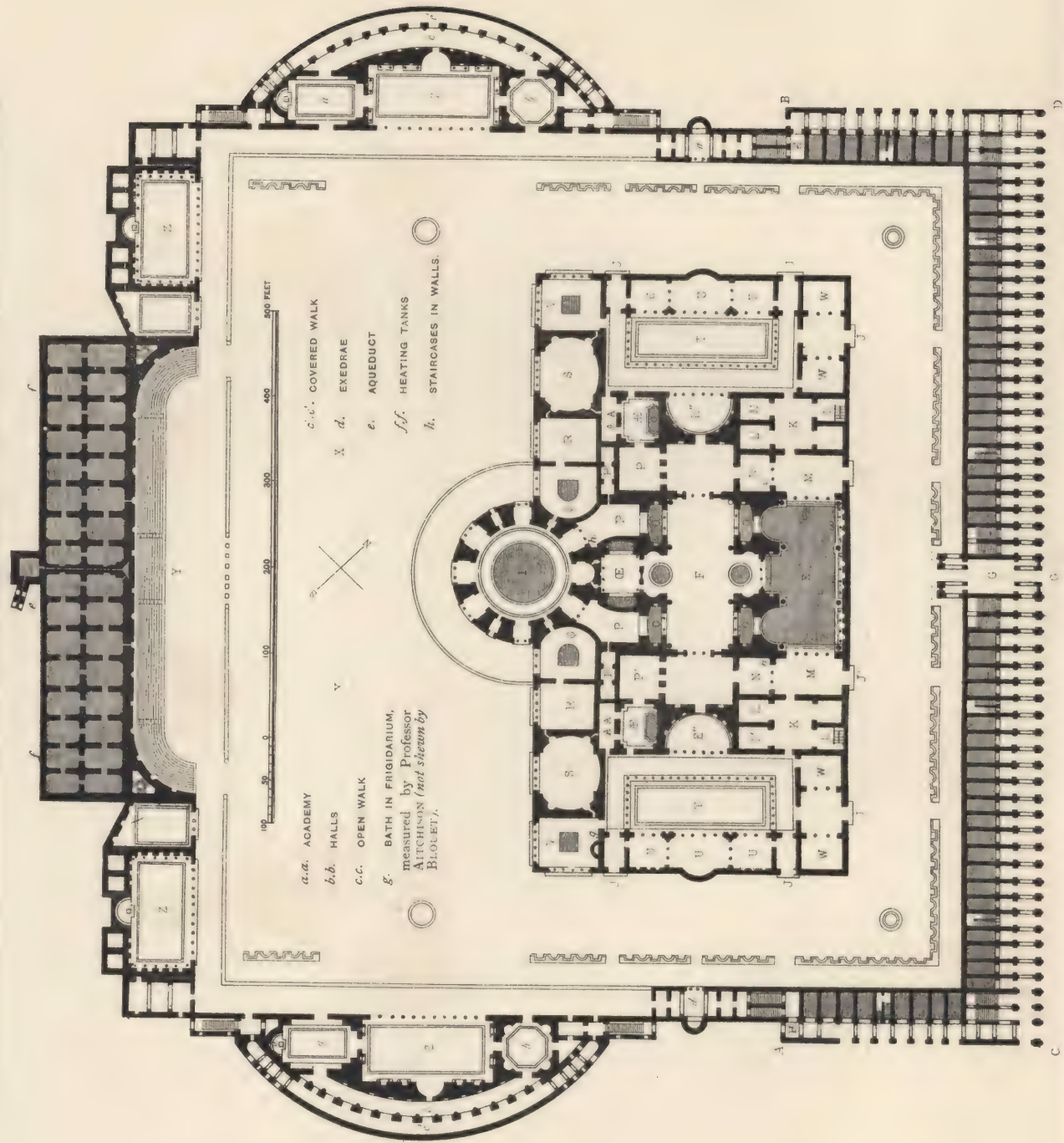
THE LATE PROFESSOR COCKERELL'S RESTORATION OF THE TEPIDARIUM OF CARACALLA'S THERMÆ.

See page 116.

The Phototype Co., 383, Strand, London.







A.C.B.B. ROW OF SMALL SHOPS, OR
LODGINGS.

E. PISCINA (CELLA SOLEARIS)

F. CELLA TEPIDARIA

G. GRAND ENTRANCE

H.H. FLANK ENTRANCES

I. LACONICUM

J.J. ENTRANCES TO GYMNASIA

J'.J'. ENTRANCES TO BATHS, CELLA.
AND SOLEARIS

K.K. APODYTERIA

L'.L'. ELEOTHESES & CONISTERIA

L.L. STAIRCASES

M.N. VESTIBULES OF CELLA SOLEARIS

N.N. SIDE HALLS

O.O. FLOOR BATHS

P.P. } PHEFURNIA
P'.P'. }

P'.P'. RESERVOIRS

Q.Q. CELLE MEDIE

R.R. " TEPIDARIAE

S.S. " FRIGIDARIAE

T.T. PERISTYLES

U.U. EPHEBEA

V.V. FRIGIDARIUM

W.W. LIBRARIES

X.X. XYSTUS

Y. THEATRION, OR GRAND STAND

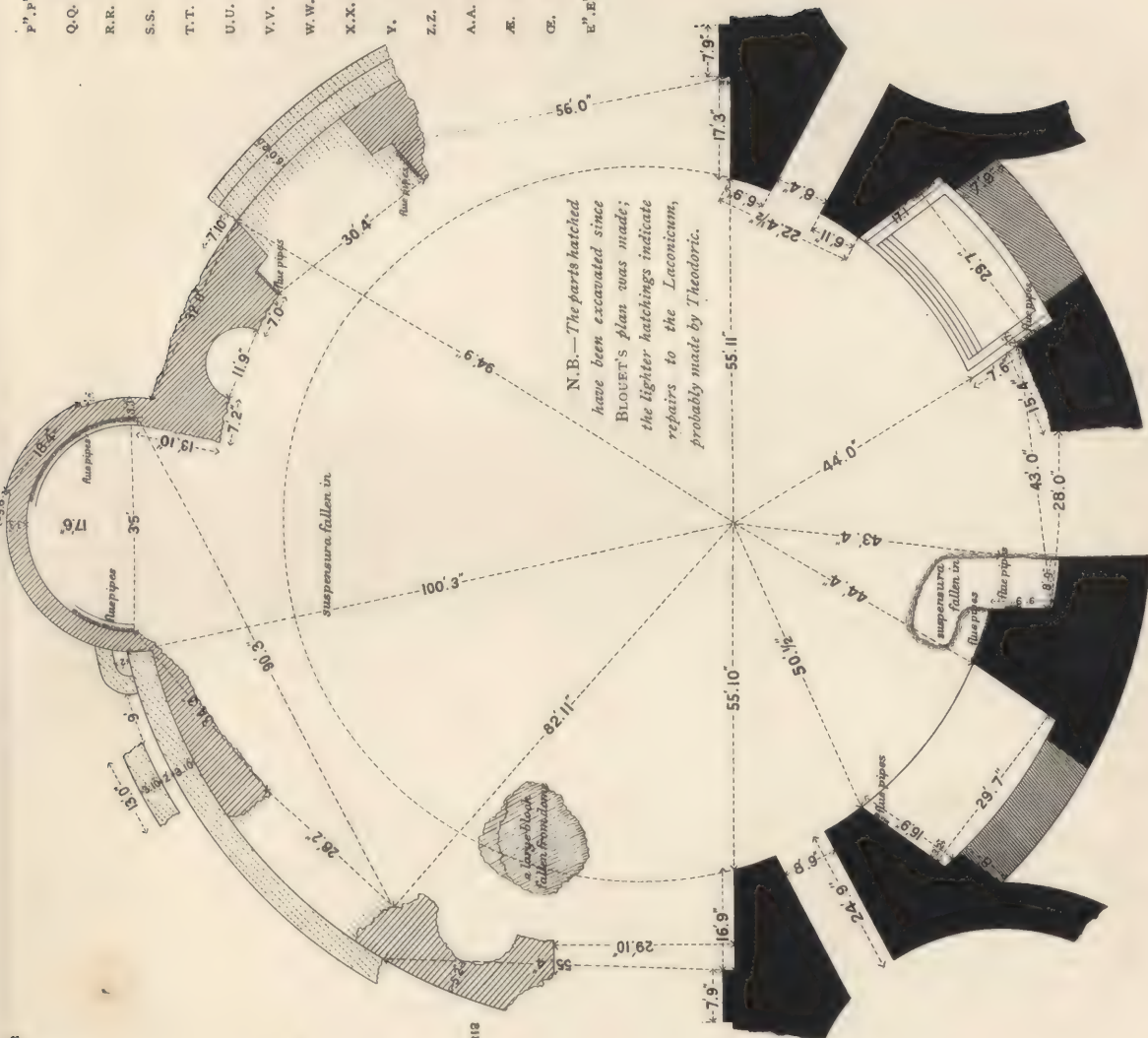
Z.Z. PALÆSTRÆ

A.A. ELEOTHESES

Æ. SUDATORIUM

Ø. CELLA MEDIA

E'.E'. EXEDRA



PLAN OF THE LACONICUM OF THE BATHS OF CARACALLA, MEASURED BY PROF. AITCHISON, A.R.A. OCT. 1888.

PHOTO LITHO BY FURNIVAL ST. HOLBORN E.C.



great cities larger baths had not been established; and he hoped in a future Paper Professor Aitchison would deal with the design and construction of such buildings.

MR. A. S. MURRAY considered that he had learned a great deal from the Paper, and that all classical archæologists were indebted to the Professor for his work upon so difficult a subject.

MR. ALEX. PAYNE, *Fellow*, had noticed that the Baths of Pompeii were warmed not only by hypocausts under the floor, but that hot-air pipes were taken all round the room; and asked whether that was so in the great Baths described by the Professor.

MR. R. L. COLE, *Associate*, inquired whether there was any trace of an entrance from the Pantheon to the buildings now in its rear; and if Professor Aitchison would enlarge his description of the iron roof, recently discovered, which supported, it was believed, bronze plates.

REV. C. L. ACLAND, M.A., thought there was no doubt that the Ancient Baths served the purpose of the modern clubs; and that a vast amount of underground politics had been transacted there. With regard to the athletic training which took place in the baths, a great difference between the Greeks and Romans ought to be borne in mind: the Greeks seemed to have done their athletics for themselves, as young Englishmen did nowadays, while the Romans preferred to have theirs done for them. The training of the Greeks, he considered, to a very great extent, the cause of their extreme beauty of human form, and to their skill in sculpture.

MR. WATERHOUSE, R.A., *President*, was curious to know to what vault the Professor referred when stating that the Baths had secured to posterity the finest domes and the widest vault. The President considered it a disgrace that Englishmen should be content with the present mean buildings used for public baths.

PROFESSOR AITCHISON, A.R.A., *Member of Council*, said he had read his Paper in the hope that others might be inclined to study the subject also, for he was convinced that if a number of skilled and intelligent men interested in the subject would devote time to it, much more might be known about it. The Baths of Agrippa were exactly opposite in their position to that recommended by Vitruvius, the southern part being usually the back part of the baths, while at Agrippa's it was the front. The question of the original destination of the Pantheon was a burning one, but who should settle it? Professor Middleton said he was there when some of the pavement was taken up, that there was no hanging floor, and that no vertical flue-pipes were found, but merely a drain from the gully under the eye; but Professor Aitchison had read somewhere that in altering one of the recesses—now a chapel—in the Pantheon, vertical flue-pipes were found. Mr. Payne had asked about the hypocaust; the only Baths one could now see much about were the Baths of Caracalla, and there were the vertical flue-pipes *in situ*, going round the walls that remained. The iron roof lately discovered was at Caracalla's Baths. Professor Lanciani had been present during the excavations of the swimming-bath, and tons of T-iron had been found there; T-irons were also found embedded in the concrete, and these T-bars, two or three feet long, had evidently been used to enable the concrete to carry from beam to beam. He thought, with the Rev. Mr. Acland, that there was no doubt that the Thermæ were largely used for gossip, although they could hardly be called clubs, and quoted a description by Seneca of one of the baths at Baia. The Professor then referred to the training of the Greek athletes, and considered the Greeks were the first people in the world who made painting and sculpture, in the proper sense of the word, possible. The dome of the Pantheon, 142 feet 6 inches, was undoubtedly the greatest dome that had been built without iron.

APPENDIX.

AREAS OF THE CENTRAL BUILDINGS OF THE ROMAN THERMÆ.

English feet superficial.				English feet superficial.			
DIOCLETIAN	.	.	351,636	AGRIPPA *	.	219,876	260,089
TITUS	.	.	336,575	PANTHEON	.	40,213	
CARACALLA	.	.	277,000	CONSTANTINE	.	137,663	
NERO	.	.	262,835	VESPASIAN	.	60,788	

The area of Caracalla was calculated from Blouet; that of Diocletian taken from Gwilt; the rest have been taken from Palladio, whose drawings do not appear to be to scale.

* Only that part shown by Palladio.

SIZES OF TEPIDARIA FROM PALLADIO, IN ENGLISH FEET.

	Height to crown of vault	Length	Width	Area in English feet superficial
THERMÆ OF AGRIPPA (length between screens) .	91	165	68	11,220
" NERO (by scale)	91	149	67	9,933
" " (with halls beyond screen) .	—	235	—	—
" VESPASIAN (afterwards called Domitian and Trajan). By scale . .	77	116	49	5,684
" TITUS (length within screens) . .	92	164	70	11,480
" CARACALLA (from Cameron, no height of Tepidarium figured) . . .	{ 108 (Blouet); 93 (Palladio) by scale }	180	78	14,040
" DIOCLETIAN (from Cameron) . .	100	194	79	15,326
" CONSTANTINE (Palladio) . . .	75	132	57	7,524

AREAS OF BUILDINGS IN LONDON.

	English feet superficial.		English feet superficial.
HOUSES OF PARLIAMENT	242,000	NATURAL HISTORY MUSEUM	154,804
WESTMINSTER HALL	20,800	NATIONAL GALLERY	65,000
BRITISH MUSEUM	244,310	ROYAL ACADEMY	44,928
ROYAL COURTS OF JUSTICE	202,731	ROYAL EXCHANGE	42,766

SIZES OF WELL-KNOWN HALLS IN ENGLAND, IN ENGLISH FEET.

	Height	Length	Width	Area in English feet superficial
VAULTED. . . The Law Courts (Great Hall)	80	230	48	11,040
Natural History Museum (Central Hall)	72	170	50	8,500
St. George's Hall, Liverpool	82	170	74	12,580
NOT VAULTED.* British Museum (King's Library)	—	305	40	12,200
Westminster Hall	90	258	68	17,544
Guildhall, London	60	153	50	7,650
St. James's Hall, London	60	140	60	8,400
People's Palace (Queen's Hall)	60	130	75	9,750
National Gallery (Venetian Room).	32	120	40	4,800
Christ-Church Hall, Oxford	50	115	40	4,600
Hampton-Court Palace Hall	45	106	40	4,240
Middle Temple Hall	47	100	42	4,200
Lambeth Palace Hall	50	93	38	3,534
Royal Academy (Large Room)	—	82	42	3,444

GEORGE AITCHISON.

* The sizes, in English measure, of three Halls (not vaulted) abroad may be added, namely:—Great Hall of the Palazzo Ragione, Padua, 80 feet high, 261 feet long, and 85 feet wide; La Lonja (Exchange), Barcelona, 120 feet long and 70 feet wide; Golden Hall, Augsburg, Bavaria, 52 feet high, 102 feet long, and 56 feet wide.—G. A.

LX.

THE HISTORY AND USES OF PLASTER-WORK, ESPECIALLY
AS RELATING TO ORNAMENTAL CEILINGS.

By Mr. BASIL CHAMPNEYS, B.A. Cantab.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

IN dealing with the subject of plaster-work, I may as well disclaim any attempt to deal exhaustively, or even comprehensively, with the very many portions of it which might legitimately be included. I propose rather to deal with it specially from a purely practical point of view, on the basis of such knowledge as comes by experience rather than by research. I shall also speak mainly of that application of the art which seems likely to be of most importance in the immediate future. In confessing to this limitation of my subject, I may plead that my motive has not been so much the wish to avoid the necessity of acquiring special historical knowledge for the purposes of the Paper, as a hope that I might speak with more weight on points which personal experience has forced on my attention. I purpose, however, commencing with a short *résumé*, in which I shall give the briefest outline of the history of the art; and, with regard to this portion of the subject, I will at once acknowledge the large debt which I shall be incurring to my friend Mr. G. T. Robinson, who has kindly placed at my disposal a Paper which he lately read at the Liverpool Art Congress. I may say that when I found that this subject, long since suggested to me, was to be dealt with elsewhere by one so competent, my first idea was to change the topic of my discourse. I found, however, that Mr. Robinson had touched to a comparatively small extent upon the portion of the subject which I had looked on as the substance of my own projected Paper, and determined, therefore, to adhere to the line I had sketched out for myself as to my main topic, while at the same time I might avoid a too exclusively practical treatise by utilising the material which he kindly supplied.

Before, however, coming to the history of the craft, I should like to say a few words as to the great and increasing importance of plaster-work to us, the architects

of the latter portion of the nineteenth century. The time has not long passed since, with a certain school, the amenities of architecture were apt to be underrated and decried. An over-rigid, and, as I believe, mistaken, interpretation of that architectural style, which was some short time back the main source of our best inspiration, had gone far towards depreciating plaster-work as a modern superfluity. The view which had been formulated in many treatises, and perhaps still more crudely in practice, was that Gothic architecture, being a style of true construction, had in all cases to expose its own anatomy; that a stone or brick wall in a Gothic building was bound to show itself as such; that in trussed roofs anything that concealed even the subordinate construction was a violation of the integrity of the style. Coats of plaster on walls, ceilings, and roofs were, according to this misreading of Gothic art, anomalies to be rigidly expurgated. Had this misapprehension affected original works alone it would have been comparatively harmless. Gothic art admits of very many elements of effect. Austere severity, no less than profuse adornment, may be compassed within its proper limits. Even if the careful study of the art shows that decoration was almost invariably contemplated, if not always realised, in ancient examples, it was none the less possible that, out of the purely constructive elements of the style, effective architecture might be evolved. It was in restoration that the more calamitous effects of this misapprehension were to be detected. It would be taking me too far from my subject if I were to attempt to catalogue all the violations of antiquity to which this false motive of restoration had given rise. Two examples must suffice, both of which are doubtless familiar to most of you. The first, that stone walls in restored churches have been stripped of their plaster, the random joints of the masonry made conspicuous by pointing, sometimes in mortar of a vivid black. For the second, timber roofs of the tie-beam and King-post types have been stripped of their ceilings, whether of sheeting or of plaster, made into open-timber roofs, and thus reduced by the falsification to mere absurdity; while the nail-holes which fixed laths or sheeting to the rafters, nay, the very grooves in the principal timbers, shriek in testimony against the vandalism.

If such a sumptuary law, arbitrarily foisted on an ancient style, tended to bring plaster into disrepute as a sybaritic superfluity, not less injurious was its superabundant and meretricious use in that style, or no style, which produced till lately the large majority of ordinary modern domestic buildings. If in the one style plaster was allowed little or no place at all, in the other it was made to do duty for worthier materials, by an obvious fraud; to run riot, and like Virgil's apple-tree "wonder at fruits not native to it." To such misunderstandings and abuses have the depreciation and consequent deterioration of the art been mainly due; it is by realising its proper position and functions in architecture that we shall re-establish and rehabilitate it.

The origin of plaster-work is lost in antiquity. As a matter of history, it is known to have been largely used in ancient Greece, in temples such as that of Apollo at Delos, and in the ancient Parthenon, and probably was still more largely employed in domestic

buildings. But of all this little or nothing remains. Of Roman plaster-work, however, enough is found to show how extensively it was used, and to what perfection its decorative uses had attained. The ancient decorative plaster-work unearthed in Rome, Pompeii, and the Italo-Greek tombs of Magna-Græcia, often retains its original freshness and precision when first brought to light—which perfection, however, is very rapidly lost when it is exposed to the air. All this work is exclusively hand-modelled. That the art of casting in plaster was not unknown is clearly proved by such an example as the figure of Eros, from Greece, in the British Museum. This art, however, like all others, lapsed with the fall of the Roman Empire. Nevertheless its influence survived directly in the East, whither it had travelled. Indirectly it is the origin, through the Renaissance, of all post-Gothic European work.

Even before the main revival of the art the sculptors of the earlier Renaissance had employed plaster, *stucco duro*, for bas-reliefs of religious subjects in portable forms. It was towards the close of the fifteenth century that its revival as an architectural accessory *in situ* was brought about.

When, in 1494, Pinturicchio was painting the Papal apartments and the *loggia* at the Castle of St. Angelo, there came to him one Lorenzo Luzzo, from the town of Feltre in the Apennines—one who, having a strong bias towards painting, nevertheless had the modesty to devote himself to the humbler pursuit of the decorative arts. With this aim in view he searched widely among the ruined cities and villas of Italy for the buried remains of ancient workmanship.

It was probably in this manner that he discovered the art of "Sgraffito," or scratched plaster-work. The process, briefly described, is this. A wall is covered with a layer of tinted plaster, and on this is superimposed a thin coating of white plaster. This outer coat is scratched through, and the colour behind it is revealed. Then all the white surface outside the design is cut away, and a cameo-like effect given to the design. This is the art of Sgraffito as known to the Italian Renaissance. There are, however, simpler processes of a cognate kind in which scratching is employed without the use of a second colour, the effect being attained by incision alone, and by the contrast of the plain surface with the abraded background. Such a form of Sgraffito obtained in the southern towns of Spain, and is found in the ruder kinds of exterior plaster-work here and elsewhere.

This art of Sgraffito was conveyed by Morto da Feltro to Florence, and there by him, in conjunction with his pupil and partner, Andrea Cosimo, applied to the stucco-fronted houses of Florence. At first these were executed simply in black and white, the black tint being obtained by an admixture of burnt straw, while the white was toned down by a water-colour tint. But the most important work of these partners recorded by Vasari is the façade of the Lanfredini Palace, some of the drawings for which are preserved in the Uffizii at Florence. These show that coloured grounds were used, and that even medallion works of fresco were inserted.

From Florence, Morto da Feltro was summoned to Venice to assist Titian and Giorgione in the decoration of the Fondaco-dei-Tedeschi. Here a complication arose:

he fell in love with Giorgione's mistress, and Giorgione is said to have died of grief in consequence; while Morto da Feltro fled, joined the army, and fell on the field of Zara.

Meanwhile, Andrea Cosimo was increasing his reputation in Florence, while fresh recruits joined in the practice of the art; amongst them were Polidoro da Caravaggio and Maturina, who carried the secrets of the art to Rome, where it flourished until the sack of Rome in 1527. So much for the history of Sgraffito-work.

Meanwhile, the art of plaster-modelling had been rediscovered in the exhumation of the Baths of Titus. This revival is associated principally with the name of Giovanni da Udine, who with Raphael studied the relief-ornaments there unearthed, and learnt to reproduce their material and effects. To Giovanni, Raphael entrusted the decorative accessories of the *loggia* of the Vatican. His too is the work at the Villa-Madama, where he was associated with Giulio Romano, who learnt from him much of the methods of the art. When Giulio Romano was engaged in the decorations of the Palazzo-del-Te at Mantua, there came to him from the neighbourhood of Milan one Francesco Primaticcio, who executed the bas-reliefs of Roman soldiers in the great hall. When, in 1531, Francis I. of France requested that "some young man who understood fresco-painting and stucco-work might be sent to him," the Duke of Mantua selected Primaticcio, and to him is due the plaster-work at Fontainebleau. Thus, then, the art of modelled plaster-work is genealogically traceable from the exhumation of the Baths of Titus to its introduction into Northern Europe. A fellow-workman of Primaticcio, Pellegrino by name, was similarly imported by Philip II. of Spain to Madrid, where he assisted in decorating the Escorial.

It is not possible similarly to associate with the name of any individual artist the introduction of plaster-work into England in the time of Henry VIII. He was, however, one who would be little inclined to be outdone in the pursuit of art and luxury by rival monarchs, and in 1538 he started the building of Nonesuch, for the decoration of which he "procured many artificers, architects, sculptors, and statuaries, Italian, French, and Dutch, as well as natives, who applied to the ornament of the mansion "the finest and most curious skill they possessed in their several crafts." Both the names of the individual craftsmen and the nature of their work are, and must to a large extent remain, matters of conjecture. The palace was left unfinished at the time of the King's death, and was bought and completed, in the reign of Mary, by Henry, Earl of Arundel. It changed hands frequently, was despoiled as a royal palace during the Parliamentary wars, and generally fell into decay; but enough of its beauty remained even to the time of the Fire of London to excite Evelyn's admiration, and desire for the proper housing and preservation of its ornaments, many of which he says "are *mezzi-rilievi*, the size of life. The story is of heathen gods, emblems, &c." That Sgraffito-work may have been used in the decoration of this palace seems possible from a picture at Hampton Court of Henry VIII. and his family, in which a summer-house is shown in the distance apparently decorated in this manner.

This seems to have been the starting point of the art of plaster-work, as developed

by the Renaissance in this country. Its further developments here I propose to trace only so far as they necessarily form part of the more practical discussion of ornamental ceilings.

It will strike you that in this review of the history of the art is found no mention of ornamental plaster-work earlier than the reign of Henry VIII.; and yet it will be known to many that plaster was used for purposes of adornment in England before the influence of the Renaissance had reached us. For instance, many architects have probably seen examples of the application of some form of plaster to some of the more elaborate wood-screens found in late mediæval churches. I have not been able to find any account of the method employed, and must, therefore, be content with the conjectures which the examination of such examples seems to suggest. I gather that in the later phases of Gothic, when elaboration had reached its utmost point of development, and when the standard of stall- and screen-work required such intricacy of detail as implies a cost which to our generation would be absolutely prohibitory, a method of simplifying the workmanship was adopted. The woodwork, in which the larger features, such as the tablings of buttresses, the larger tracery, plinths, and mouldings, were wrought by the tool, was covered by an incrustation of some sort of cement or plaster, which seems to have been stamped while soft by a die. In the examples of screen-work which I have examined the material seems to be used only in parts where a considerable repetition of detail is admissible. For example, the faces of the minute buttresses which run up the shafts of screens, often not more than $1\frac{1}{2}$ to 2 inches wide, are found covered with this material, in which is produced a minute and almost lace-like tracery, such as could be wrought by the carver only at the expense of infinitely delicate workmanship. The fact that these screens were completely covered with pigment and gilt obviated any awkwardness in the change of material; while the plaster, probably composed with an abundance of size, made an excellent foundation for decorative painting.

I have little doubt, too, that the material was very frequently used for other ornamental purposes in mediæval work, and though I am unable to give any authority for the conclusion so far as England is concerned, I have given hostages for my opinion by employing it in the decoration of Gothic ceilings, obtaining in this material low reliefs of stars, angels, and other ornaments, which certainly seem, when decorated, to tell better, and appear more in harmony with the character of Gothic decoration, than mere painting on the flat. There are certain examples, as I have been informed on good authority, of bosses being cast in lead and applied to woodwork, though only, I believe, in late work; and it seems difficult to imagine that so available a material as plaster, if used at all, as I have shown that it was, would not have been employed in more ways than one. At any rate, whether authority there be or none, I can see no objection to its use in Gothic churches, so long as it be so employed as neither to take the place of, nor to imitate, any material of greater dignity. Historically, the use of plaster in England may be dated from the time of Matthew of Paris, who appears to have introduced it himself. It is known, too, that besides the purposes which I have assigned to

its ornamental use as mentioned above, the nimbus and accessories of the early Italian painters were executed in *gesso* or plaster, and it may be assumed that all the minor reliefs, fringes of garments, patterns, &c., were brought forward in this material. Viollet-le-Duc mentions this use of plaster, and also, under the article "*Cheminée*," records instances of sculpturesque plaster-modelling in the hoods of chimney-pieces; and it may be inferred that the art, which was developed to the highest point in Italy in connection with decorative painting, and to a less extent in France, was not unknown in England, which was architecturally so closely in touch with the neighbouring country during the Middle Ages. I have, however, been unable to find any record of such examples, and the question must remain a matter for conjecture.

It is, indeed, in its application to ceilings that the further history of the art will be of principal interest, both practically and historically; and one can trace in the development of the use of this material in such features all the principal phases through which architectural style passed from the Renaissance till the early portion of the present century. No doubt the erection of Nonesuch House gave a special impetus to the art, and the more elaborate forms of plaster-ornamentation are posterior to this. It will, however, be found, I think, that an earlier and a simpler form of ornamental ceiling had been in use, and that some traces of this antecedent manner survived to a later date. The fact that all traces of Nonesuch House have disappeared increases the difficulty of the investigation. It may, however, I think, be safely assumed that some at least of its ceilings reproduced in the new material the most salient features of the elaborate Tudor vaults of the same, and of a rather earlier, date. There are certainly extant or recorded examples of this kind of treatment. Such a one is the saloon, formerly called the Fish-room, of Audley End, which is probably of not much later date than Nonesuch House. In this ceiling large and heavy pendants fall some feet from the ceiling, dividing it into thirty-two compartments.

But it is not rare to find examples of plaster ceilings which, in point of character, if not of actual date, seem to suggest an earlier departure, or it may be that both kinds of ceiling were simultaneously developed, the more elaborate in imitation of the stone vaulting, the simpler from the wood ceilings. In the latter type of ceiling the earliest show the same features as the wooden ceilings, the intersecting timbers merely being transformed into plaster ribs. These, however, being divorced from all constructional purposes, could be freely used for merely decorative effect. They began, therefore, to take first a diagonal form, as in Hever Castle; then more intricate geometrical forms were introduced; to these succeeded curves of various kinds, the geometrical and curvilinear being often combined, as in Crewe Hall, and at Loseley, where the drawing-room ceiling reproduces most closely the features of a wooden ceiling, even to the bosses. During this process of liberation of the line, the plaster ribs gradually forgot their origin—namely, moulded oak ribs—and came to be looked upon as purely decorative appendages to the ceiling; and when, in the early portion of the seventeenth century, strapwork began to be the prevalent ornament, these ribs readily transformed themselves into the new type.

This seems to me to have been the principle of development ruling the transition. It must not, however, be supposed that these changes were regular or methodical. The various types often overlapped, and were intermingled, and it may be worth while to notice a few special examples which show the combinations that an age of exuberant fancy introduced.

At Brougham Hall a flat ceiling of the great hall is supported by arched and panelled timber trusses, and is itself subdivided into small cusped diamonds. At Crewe Hall an elaborate strapwork design is combined with pendants of considerable size, which features, as I have stated, owe their origin to the stone vaults of the Tudor period. In the Gilt Room of Holland House, and at Benthall, the main lines are those of actual timber construction, and probably, at least in the latter case, are used to conceal constructional timbers, while the spaces are filled with strapwork designs. But there is, indeed, no limit to the variety which, even in our own country, plaster-ceilings of this date exhibit, and I can merely mention a few as indicating the abundance of material which would be available for a more complete research.

But to revert once more to the principle of development which I have been endeavouring to sketch.

With the complete liberation of line in the pattern of the ceilings, figures of animals, *amorini*, and other similar adornments began to be introduced; straps began to convert themselves, as to their heads and tails, into grotesque animals, dolphins, gryphons, and other such conventionalisms. In a most interesting and, as I think, beautiful ceiling at Slyfield Manor House, in Surrey, the combination of strapwork, *amorini*, and delicate ribbon-work and swags is peculiarly interesting, and it has, as I may confess, been to me the "motive" of many an ornamental plaster-ceiling. A comparison of the ceiling of the chapel with that of a room below, which I take to have been the withdrawing-room in the original and complete house, will serve to show—for I am convinced that the pair of ceilings are of the same or nearly the same date—how great the scope of design was at this most prolific period, the earlier half of the seventeenth century; and I am disposed to think that this epoch, in the matter of plaster design, bears the palm for perfection as well as for variety. It is at this stage that the utmost boldness is found, I think, combined with refinement of design, while the most perfect comprehension is shown of the effect proper to the material.

Of ceilings of later date, not so much need be said—partly because every one is more or less familiar with those of the eighteenth century, partly because their history shows a gradual decadence—boldness and freedom gradually giving way to mere uninteresting refinement, until in the time of the Brothers Adam a delicate prettiness was all that survived, and from that moment the art may be said to have lapsed; not but that many very excellent examples of the dates of William III., Queen Anne, and even of the Georgian period, may be found; but of these, the merits seem to be fully contained in the examples of the Jacobean period, from the standard of which they seem to have fallen in direct proportion to their distance in time. At any rate, as there is much more to be said on the general subject, I must pass on to the further

and concluding heads—namely, first, the principles which it seems to me should govern the design of ceilings ; and secondly, the methods of workmanship.

For the first, the main question is, what do we want in a ceiling ? Ornament we certainly require, when we can get it. The ordinary flat plaster-ceiling is an institution to be put up with when we can get no better ; but we all know only too well its almost invariable defects—how it generally cracks, and develops spontaneously quite original patterns indicative of rivers, which too often lead, like Niagara, to a catastrophe ; how it shows in time the precise position of the joists above—a tendency which I have often sought to explain, and believe to be this. The plaster which is separate from the joists is more pervious to the atmosphere than that which is in more direct contact. The air in passing leaves behind it particles of dirt, assigned in larger measure to the unattached than to the attached portions. Consequently the joists show themselves as lighter lines on a more or less dirty background. This by the way. To explain the evil is not to obviate it. The ordinary plaster-ceiling is more or less of a bugbear to all architects. Nevertheless I greatly prefer its unpretentious, infirm, and even dingy commonness, to overdone ornamentation ; for the first and primary necessity of a ceiling is, that it should give repose to the eye. It should never be importunate. It is not the portion of the room on which the eye naturally rests. For the study of Michelangelo, Raphael, or even of Giulio Romano, we may be willing to execute interesting gymnastics, even to lie on our backs with binoculars to our eyes. But even this we do exceptionally, and with some self-consciousness of absurdity. In our everyday lives it will be out of the question—we should desire so much enrichment only as shall be subordinate to that on perpendicular surfaces, which may be more readily seen, and such as does not militate against the sense of repose. The methods of decorating ceilings may be divided into three—first, treatment by colour only ; secondly, by simple relief ; thirdly, by relief and colour combined. Under the first head is included every form of decorative enrichment, from figure-painting to the use of wall-paper.

It is not very probable that in the usual practice of an architect the more elaborate forms will be required. The figure-paintings on ceilings which, under the auspices mainly of Italian painters, were much in vogue during the last century, and of which many examples remain, are scarcely likely to be revived—nor do many of us, I imagine, wish that the fashion should come back. For practical purposes we shall find ourselves left to do the best we can with the use of patterns from which figure-work will be in the main excluded. And in the use of pattern-work, whether it be flat or in relief, we shall find that very much the same laws apply. The principal rule in either case will be, as stated above, to observe great moderation and repose. So that if the effect be produced by colour only, the colouring should be harmonious, and with but little difference in tone between the pattern and the groundwork. If relief be used, the relief should be low. But there are other considerations which must not be lost sight of. Of these the most important is that the pattern employed must not be one which leads in any one direction. On perpendicular surfaces a pattern

which has an upward tendency or growth is clearly in its right place. That which has a horizontal tendency may often be legitimately and successfully employed. On a ceiling the principle is altogether different. In this case the growth or tendency must either be neutral—that is to say, it must lead nowhere in particular—or it must be either from the cornice towards the centre of the ceiling, or from the centre to the cornice. It is obvious that all such patterns as are small, and consequently have to repeat themselves, must come under the first rule and must have a neutral tendency: that is to say, each section of the pattern used must be self-centred; and there are various kinds of patterns which will fulfil this requirement. Geometrical patterns, such as squares or diamonds with central ornaments, reticulated or interlacing patterns of various kinds, and spirals, are all, so far, admissible; and it is clear that such a pattern may be of any size, so that it be less than one-fourth of the ceiling to which it is applied.

There are, however, some further reservations which may be made as to the use of patterns. In the first place, rectangular patterns are apt to militate against another principle which I have advocated—that, namely, of repose; rectangular lines have a tendency to force themselves rather importunately on the attention, and seem therefore less fitted for use in ceilings than those which are more flowing. I should therefore advocate the use of reticulations or spirals where a repeated pattern was employed. There is at the present time a sufficient number of ordinary wall-paper patterns, as well as of various sorts of stamped or relieved material, which fairly well fulfil the conditions I have laid down. These, however, will be applicable only to the more humble standard of decoration, and if a richer and more varied effect is sought, resort may be had either to hand-decoration in colours, or to plaster-relief, and we shall then be free to employ a design as large as the ceiling admits of, provided that it fulfil the condition of leading neither down nor across the room. It must, therefore, either focus towards the centre, or radiate from the centre towards the walls. On first principles either of these methods would appear to be equally admissible. I have, however, found in practice that such designs as seem to grow from the cornice rather than from the centre produce a more satisfactory effect. The reason of this is not perhaps obvious, but I think that it may be accounted for. Upward growth is the best “motive” of decoration in walls; lines which appear to harmonise with this upward tendency, and carry it forward into the ceiling, are perhaps naturally the more appropriate. As a confirmation of this principle, I have found that an entasis or a doming of the ceiling immediately above the cornice, however slight, often tends to improve the effect. If this system is adopted, it usually adds to the effect of the ceiling if a certain amount of plain surface is left about the centre. If the other plan were adopted, that of radiating from the centre of the ceiling, I should be disposed to leave a plain or neutral space above the cornice; so that the respective tendencies of the ceiling-decoration and of the wall-decoration should not come into immediate collision.

So much for the general principles which should govern the design of ceilings. As to the particular type of design which seems to give the best effects, I have already

hinted my own preferences in giving a brief account of the ceilings of past times. No school of design seems to me so applicable as that of which the Slyfield ceiling is an example; there strapwork is used in connection with a subordinate pattern of swags and sprays, and combined with and enlivened by the introduction of grotesques.

In adapting the "motives" of this type of design it will be found that the base of the ornament, the strapwork, can best be used to give breadth and freedom to the whole, while the subordinate patterns or sprays may be so handled as to prevent the breadth from degenerating into coarseness. I have found by experience that there is no need to be afraid of the size of the main pattern. The largest curves that the space admits of may be safely laid out, and dignity gained thereby, while refinement may be insured by the interplay of the subordinate decoration.

I have still to speak of the methods of workmanship—both those which prevailed in the past, and those most available for contemporary purposes.

There are three principal modes of executing plaster-ceilings at the present time. The first is to lay a flat surface of plaster and build the ornament upon it. The second is to cast the entire ceiling in sections from a clay model. The third is to work the ornament in the plaster while it is soft and manageable. It is obvious that the two latter methods may to some extent be combined; some portions may be cast, while others may be worked in the soft plaster.

The first of these methods, that of building the ornament on a flat background, has, as I believe, no authority in antiquity, nor is it satisfactory. The effect of a perfectly flat background is hard and wooden. In the best examples of old ceilings the effect is soft and varied. The background is seldom level, but is depressed to meet the relieved ornaments, and the whole effect is somewhat similar to that of good stamped leather. This effect is obtainable by either of the two latter methods, between which, as I think, the choice lies. Of these methods the former is as follows. The drawing of the design, to a sufficiently large scale—say one-eighth—with a few enlarged sections, is given to the modeller, who first develops as much as may be necessary, usually a quadrant, in a full-sized drawing, at which stage the architect will have the opportunity of correcting and improving the lines.

The next process will be to model this portion in clay. Then again the architect will look into the detail, and check the amount of relief in each case; and by placing the model on the floor and holding a looking-glass so far above as to give in the reflection the apparent height of the natural ceiling, he will obtain a very fair idea of the effect of the ceiling in its destined position. The model will then be divided up into sections of a size suitable for fixing; casts of each section will be taken in wax or gelatine, and these will be run with liquid plaster, layers of canvas being introduced at intervals to give the whole tenacity.

The plaster being set, the sections will be fixed to the joists by powerful screws, as well as by keying to the laths; the joints will be carefully fitted by the modeller and any irregularities corrected. Nothing will remain further than, after a sufficient

interval, to paint the ceiling in good oil-colour. In doing this, parti-colours may of course be used; but I find that, generally speaking, the most satisfactory effect is obtained by using one tint, and producing as nearly as possible in tone and texture the appearance of carved ivory.

The third method, that of modelling entirely in the soft plaster in position, admits of precisely the same result as that first described. It is, however, attended by far greater difficulties. In the first place, everything has to be done on a horizontal surface over the head, a most difficult position in which to work. Secondly, the whole has to be completed while the plaster is soft, and the period during which errors may be corrected is strictly limited by the time which the plaster takes to indurate. Thirdly, it must be done throughout almost entirely by the modeller's own hand. All this leads to a great increase of cost. A further objection is that the designer, instead of, as in the former case, being able to obtain a complete supervision by visits at special and critical periods, has to be in and out during the entire process, and then has to judge of the effect as best he may by peeps through the scaffolding-boards. Any defects discovered subsequently are irremediable.

This is generally believed to have been the ancient method of execution. I have, however, found evidence that it was not so—at least invariably. I remember to have seen an old house in Herefordshire, the drawing-room of which has a very fine ceiling of seventeenth-century workmanship. In the attics of the same house are found, introduced in window-jambs and other positions, portions of the same design. These are clearly unsuccessful castings utilised in subordinate positions. My belief is that the usual method was a combination of the two processes. The leading ornament was cast and placed in position on the soft plaster. In this the subordinate sprays were modelled, and the background received at the same time its varying surface. Not dissimilar was the method of much mediæval decoration, where the main ornaments were stencilled, while the sprays and minor foliage were subsequently filled in by free hand.

I may mention in conclusion that those who seek for "motives" for such a type of design as I have been here advocating, will find abundant suggestions in old book-plates of the late sixteenth and early seventeenth centuries; and, at a period which is not over-prolific of pattern design, such a hint may be not unacceptable.

This conference has shown, I think, how important an art that of the plasterer has been in the past. It is also one which possesses special attractions for the architect, not the least of which is that in it, almost alone among the arts with which he has to deal, machinery has no place. It is of the utmost versatility, capable of adapting itself to very varied requirements both in interiors and exteriors. It may in its humbler developments be satisfactorily dealt with by the mere journeyman, and in its higher give adequate scope for the genius of the accomplished sculptor. It has fallen upon evil days, having been discredited by misuse in a sphere otherwise legitimate, while it has been ousted by mistaken theory from some portions of its ancient domain.

We shall accomplish by no means an unnecessary task, or one likely to meet with scant reward, if we first define its proper scope, and then do our best to develop it within such limits. In an age like our own when, traditional art having lapsed, something like a second Renaissance is needed to restore architecture to its legitimate position, the plasterer's art has by no means the least claim to a revival.

BASIL CHAMPNEYS.

[Notes by EDWARD J. TARVER, F.S.A., *Fellow.*]

There is no denying the grandeur and beauty of well-designed open-timber roofs; but there is also no denying the cold draughts that rush down from them upon the uncovered heads of the congregation, unless considerable expense be incurred in making them air-tight; and, however air-tight be the covering that is laid upon the backs of the rafters, this covering is but a skin, after all. Now a difference of temperature on the two sides of any skin (human or otherwise) is, by a law of Nature, constantly trying to equalise itself. In this, as in every other struggle, the weakest goes to the wall—nay, in a church, it runs down the wall, vanquished, to avenge itself upon human nature in the shape of colds or rheumatism.

If the skin be transferred from the back to the underside of the rafters, a buffer of intermediate air-space is obtained, which somewhat reduces the full force of the struggle; but a deeper air-space is better still.

The best means of resisting the external air is to introduce stone or brick vaulting between it and the interior of a building. This also forms a protection against another of the elements—namely, fire—which may break out among the roof timbers; and wise are they who determine to make their churches safe as well as beautiful by this means, and wiser still will be the architect who shall, by some improved treatment, reduce the cost of vaulting without losing its beauty. This question of cost has led to the use of wooden boards and ribs, either in the forms proper to stone vaulting, or as a simple lining to the proper structure of a wooden roof. The effect is pleasing and, as people say, “ecclesiastical.” The weak point in the arrangement lies in an unfortunate habit that wood has of shrinking, and thereby admitting our old enemy the outer air, unless checked at the extra cost of ploughing and tonguing the joints.

Our other old enemies, as people call them—the churchwardens of the last century or two—made no ado about adding an inner skin of lath and plaster to their still older enemies, the draughty open-timber roofs. This skin they either nailed to the “trussed rafters,” or fixed as an independent flat ceiling nailed to joists. Perhaps they should have renewed the outer covering instead; but they lived before the days of “board and felt” and of the various contrivances for avoiding dry-rot in connection with that same felt, and perhaps they would have done more mischief to the timbers if they had stripped and re-covered them from the outside than they did by nailing their ceiling laths on the inside. As a matter of history it should be remembered that

open-timber roofs had given place to ceiled roofs in the new buildings of their day, and the hidden carpentry partook more of science than of art. The art was devoted to the enrichment of plaster ceilings, thus keeping alive a very old craft which is not to be despised by architects. It must be admitted, however, that, when adding ceilings to old churches, the churchwardens thought more of comfort than of art.

Now, cannot we help ourselves to each and all of the good things above named—*ornamental construction* applied to as much of our roofs as we wish to expose, *comfort* gained by interposing an unshrinking skin between ourselves and the roof covering, and *surface decoration* obtained by colouring or enriching that plaster skin?

We can, indeed, do better than our predecessors did when they stuck on a wreath here and there without deriving any constructive advantage therefrom. We can, as Pugin preached, ornament our construction by the use of a modern material, the capabilities of which have not yet been fully developed. This material is not at the mercy of rafters or ceiling-joists twelve inches apart, for lathing to; or even twenty inches apart, for nailing boards to. It can be prepared beforehand, in slabs of any size or curvature, and be stiffened, not only at the back, but also on the front or soffit, with ribs arranged in patterns which will add so much to its strength and rigidity that it will only need fixing at long intervals. Although it cannot compete with the strength of vaulting, it is a good fire-resisting material. The one danger to be guarded against is the damage that would result from a leaky roof over this plaster-ceiling. Such disasters are most fatal where the ceiling is flat; but precautions would be taken to carry off any rain that should find its way to the sloping back-surface of the ceiling, which should be rendered waterproof. As to the design of such ceilings, it would be impertinent to suggest it to any architect who knows how to use them. He will, as usual, do well to study the past by observing the effect of plane or curved surfaces in ceilings or vaults, and by selecting any ideas that may be of use, discarding all others. For instance, to copy a stone vault the ribs of which spring from their impost to meet their fellow-ribs at the crown, as an arched construction, would be a misapplication of the material. What has to be thought of is a surface, chiefly supported from behind, and so ribbed that it shall not sag. Let the tie-beams, collar-beams, and curved braces of each principal truss be exposed, if necessary, to tell the constructive tale of the roof, and let the plaster extend from principal to principal to keep the congregation comfortable and free from draughts.—EDWARD J. TARVER.

* * The Discussion [see verbatim report in JOURNAL OF PROCEEDINGS, Vol. V., pp. 301-2] of Mr. Champneys's Paper was restricted, from want of time, to remarks by Professor Aitchison and Mr. Slater. A brief abstract of them is here appended:—

PROFESSOR AITCHISON, A.R.A., *Vice-President*, said that though he generally preferred ornamental plastering to be in low relief, they were by no means bound to restrict it to low relief. Much of the

work of the kind done under the orders of Inigo Jones and Sir W. Chambers was in high relief. The most beautiful ornamental plastering he had seen was in a vaulted chamber of Hadrian's Villa, about fifteen years ago; and it appeared to have been entirely modelled by hand. The art was not entirely lost, for he believed that, by adding treacle, sugar, milk, or size to the plaster, it could be kept for many days soft enough to model. Such work had the charm of variety which cast-plaster never possessed. In the ruined part of Hardwicke Hall there were admirable examples of the methods formerly used—the larger projections blocked out in coarse plaster, and the details finished in fine, but whether by casting or handwork he could not say.

MR. JOHN SLATER, B.A., *Member of Council*, instanced what he considered to be an illegitimate method of treating plaster. Mr. Champneys had stated that all plaster-decoration was derived from woodwork; but at a building which possessed some elaborate ceilings, and in which he (Mr. Slater) had made extensive alterations a few years ago, he had found beams and their projecting members all of plaster, but carefully framed and varnished in imitation of oak. He also referred to the introduction into ceilings of the badge or coat-of-arms of the family for whom the work was done—a favourite *motif* of the sixteenth and seventeenth centuries.

LXI.

THE ORIGIN OF ROMAN IMPERIAL ARCHITECTURE.

By GERARD BALDWIN BROWN, M.A.Oxon., Professor of Fine Art in the University of Edinburgh, *Hon. Associate*.

Mr. Alfred Waterhouse, R.A., *President*, in the Chair.

MR. PRESIDENT AND GENTLEMEN,—

THERE is no part of the past history of his art more practically interesting to the modern architect than Roman construction, for Rome has been the immediate or remote progenitor of all modern styles. Four great mediæval styles were offshoots from that of Rome. Byzantine and Saracenic architecture in the East, Romanesque and Gothic in the West, carry out the traditions of arch and vault construction established throughout the realm of the Cæsars, while the Renaissance, with its reaction against mediævalism, represented merely a more direct return to the fountain-head from which mediæval architecture and art had themselves ultimately been derived.

The architecture of Imperial Rome represents thus the starting-point of the development of construction in the modern world. All those threads of connection which, running through the various phases of modern practice, make after all a unity of the architectural history of Christendom, lead back to Rome. Hence, to change the metaphor, the Rome of the Cæsars is like one of her own great *castella* or reservoirs, built to store the water brought in from the Campagna by the aqueducts, and to distribute it through many branching channels throughout the city. With these branching channels—the architectural styles of the modern world—all are familiar, but the original sources of supply have been far less studied, and the formation of the Roman style, as in itself a subject for investigation, has never yet formed the subject of a monograph. What Rome made the modern world in architecture we know; how Rome herself was made we are hardly yet beginning to inquire. Yet no subject can be of wider interest, as any light thrown on the early history of what became in after-time Roman architecture tends to bring the ancient and the modern worlds more closely together, and to make a unity of architectural history as a whole.

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What has been the prevailing view on this subject? In the introductory chapters to his *History of Architecture*, published in 1849, Mr. Freeman speaks of the "two great principles of mechanical construction which pervade all architectural works" that "may be taken as the types of the two groups under which we may primarily arrange all styles of architecture." "These," he says, "are the entablature and the arch." The view which, if not still generally received, at any rate still makes its appearance often enough in architectural treatises and papers, was to the effect that the entablature was specially Hellenic, the arch specially Roman; and it was further held that the Romans of the Empire were accustomed to borrow from the Greeks their trabeate forms, and to plaster them on, as a meaningless frontispiece, over their arched constructions. The late Gottfried Semper, in his epoch-making work *Der Stil*,* was the first to ask the pertinent question on what grounds we assume the arch to have been a native Roman form, and the column and architrave a later addition from a foreign source; and the question thus raised by Semper is leading to a general reconsideration of the traditional views with respect to the history of arched construction, and by implication the origin and development of the architecture of Rome.

In that history there is one outstanding landmark, the Pantheon of Marcus Agrippa at Rome. For the dedication of this work we are fortunate in possessing a date which can be accepted as beyond dispute, the year 27 B.C.† The dome of the Pantheon can in this way be established as a fixed standard of comparison to which constant reference must be made in all discussions on the history of vault-construction. The Pantheon, being a noteworthy and even surprising phenomenon, has, of course, to be accounted for. The Romans could not have built the Pantheon by some sudden inspiration, and it is natural to assume a long course of training and experience before they could have reached the pitch of skill required for the construction of such a masterpiece.

Had the Romans, however, the opportunity of acquiring this training and experience? What was the actual history of the arch at Rome before the building of the Pantheon? Do the known facts justify the impression conveyed by so many architectural writers of older and later date, that the Romans went steadily on from small things to great till they reached by natural stages the state of efficiency testified to by the Pantheon? Is it possible, that is, to trace at Rome the stages which were obviously to be passed through before such a work can have been accomplished?

This question can best be considered by the help of a very brief review of arch and vault construction in the ancient world.

Fairly common appears to have been the small domed hut, oven, or granary covered with a vault of mud or crude brick or rubble, which has been built in the East from time immemorial in the same fashion in which it is constructed now. The wall-paintings of the Egyptian tombs often exhibit rows of these small structures used as granaries.

* *Der Stil in den technischen und tektonischen Künsten*. 2nd ed. 2 vols. Munich, 1878-79.

† See footnote, page 157.—G. B. B.

As regards ancient Mesopotamia, the group of domed buildings shown in a well-known bas-relief from one of the Assyrian palaces [Layard, *Monuments of Nineveh*, second series, pl. 17) may probably be referred to this class, and every traveller to the East will most likely be able to call up before his mind hundreds of modern examples in the towns and villages of Persia and Central Asia. Constructed by the rule of thumb, and needing no centering, such embryo vaults were doubtless as common in Asiatic lands and in Egypt in ancient times as they are to-day. The enigmatical "Tholos" of the Greeks may have had a similar form. These may be taken, then, as forming the first and simplest class of vaulted structures known to the ancient world. The next class embraces what may be called engineering structures, especially vaulted conduits of various kinds. These do not appear in Egypt, but they are represented in Mesopotamia by a series of very cleverly constructed arched conduits, with circular, elliptical, and pointed sections which pierce the massive substructures of the palace at Khorsabad, erected by Sargon II. of Assyria before 700 B.C. These arches are of burnt brick, and the shaping of the tiles as well as the manner in which they are put together give evidence of accomplished skill [Victor Place, *Ninive et l'Assyrie*, i. 270 ff.].

Early arches of this form, but constructed of stone and round in section, are found also in Western lands. The Etruscans, the connection of whom with the East is a fact now generally recognised, thoroughly understood the value of the arch for underground structures of the kind here spoken of. Professor Middleton states that a vaulted drain, fourteen feet in diameter, roofed with a half-round tunnel vault composed of properly cut voussoirs, exists at the old Etruscan town of Gravisca [Ancient Rome in 1888, p. 77].

It is noteworthy that the Greeks of the mainland, who are not supposed at any period of their history to have made essays in vault-construction, showed that they understood the value of the arch in subterranean work by constructing a passage twelve feet wide, vaulted with properly-cut stone voussoirs, though without a keystone, at Olympia in Peloponnesus. The vaulted passage ran through the sloping mass of earth heaped up to accommodate spectators of the games in the Stadium below, and seems to date from about 300 B.C.

A third class of early vaults includes bridges and arched aqueducts, in which the form of the arch is conspicuously prominent, though the structures have still an engineering rather than an æsthetic character.

The dwellers by the Euphrates and Tigris could not accomplish bridges of stone or brick, while they had no occasion to bring water from a distance on aqueducts. The famous bridge over the Euphrates at Babylon had stone piers, but the platform was of wood. The Etruscans, with their excellent building-stone, constructed bridges the arches of which had a span of as much as twenty-four feet [Prof. Durm, *Baukunst der Etrusker*, p. 33].

A fourth class of early vaults comprises those used for city-gates; and these are of greater importance for our purpose, since they possess a more architectural character. Egypt does not supply any examples, but both the Assyrians and Etruscans made free use of them. The ancient city-gate consisted of two doorways separated

from each other by the thickness of the rampart or by a passage flanked by lateral walls. Such doorways, as well as the passages through the rampart, were among these peoples commonly covered with semicircular vaults. In Assyria this fact is attested by the appearance of arched gateways in the delineations of fortified towns on the sculptured slabs and the bronze plates of the gates from Balawat, in the British Museum, as well as by the actual discovery and dismemberment by Place of an arched gateway at Khorsabad, in which the passage was vaulted with three concentric layers of sun-dried tiles set in clay mortar, with radiating joints filled in with mortar to the required shape [Place, *Ninive et l'Assyrie*, i. 169 ff.]. The vaulted gates of some of the old Etruscan cities still exist, and are constructed in the same manner as the underground conduits.

It is noteworthy that architectural enrichment is employed in both countries to emphasise the form of the arch and give it æsthetic value. In the best Etruscan example, at Volaterræ, the stone arch springs from moulded imposts, and the springings on each side as well as the keystone are marked by projecting heads in bold relief. At Khorsabad there are no imposts, but the form of the arch is repeated on the wall above by an archivolt of coloured tiles containing a design of winged genii interspersed with rosettes.

In the case of none of these classes of vaulted structures can the arch be said to form the integral element in an architectural effect, or to become the determining feature of a building. Its use is strictly limited, and there are no signs of any desire to extend it. If Place, the explorer of Khorsabad, is right in his theory that barrel-vaults in crude brick were employed for the roofing of the apartments of the great Assyrian palace, then here is certainly a much more extensive use of the vault, and one in which it takes its place as an important though concealed architectural feature. The evidence he brings forward in his great work, *Ninive et l'Assyrie*, is quite sufficient to relegate to the realm of the fanciful Fergusson's somewhat too hasty reconstruction of the Assyrian palace as a columned structure; yet it is perhaps hardly strong enough to warrant acceptance of the brick vault or cupola as the covering of *all* the rooms in the palace. MM. Perrot and Chipiez, however, accept the barrel-vault for all the narrower apartments and passages, and *a fortiori* for all doorways [*Histoire de l'Art dans l'Antiquité*, ii. 163]. Still, in any case, the exterior appearance of the monument would be quite independent of the constructive form used within, and the arch could in no way be said to be the life of the whole structure.

Turning now to Rome, the arch is found there used from the earliest times in the same engineering spirit in which it was employed by the Etruscans. Vaulted conduits of stone, of which the famous Cloaca Maxima is only one example, were constructed at Rome some 600 years before the Christian era. That the city-gates in the enceinte of Servius Tullius were arched may be assumed by comparison with the above-mentioned Etruscan examples as well as by those occurring in ancient Latin cities. Arched aqueducts, for which the city was afterwards so famous throughout the world, make their appearance on a small scale comparatively early. Frontinus states that the

first aqueduct, constructed in 313 B.C. by the Censor Appius Claudius, though mostly underground, was carried on arches for sixty paces within the Porta Capena. The Aqua Marcia, built in 144 B.C., was "in many places in the upper portion of the valley "supported by arched structures" [Frontinus, *De Aquæductibus*, 5]. In the matter of bridges the Romans prudently contented themselves during many centuries with a single, easily dismantled, bridge of wood across the Tiber, to which was added one with stone piers but wooden platform in 179 B.C. Arches of stone were added to this in 142 B.C., while another arched bridge of stone was built in the year 62. The Romans of the Republic were thus evidently familiar with the arch in these forms of gate and bridge and aqueduct; but there is no sign thus far that they aspired to use it in a more ambitious fashion. Up till the last century of the Republic no real step in advance seems to have been made, nor can the development of the architectural use of the arch be said even to have had a beginning. It is only within the last century B.C. that the new experiments begin, under conditions which may now be passed under review.

It is a mere fancy that the Etruscans and Romans possessed an arched style while the Greeks confined themselves to trabeate forms. The Etruscans and the Romans, or, as experts now prefer to say, the old Italians, possessed not an arched, but a trabeate style, in which they constructed their temples, the only public buildings of importance in the older classical cities. The Italians did not differ in this respect from the other Mediterranean peoples. The Egyptians, the Phœnicians, the Greeks, the old Italians, all employed from time immemorial the column and architrave as the essential constituent elements in all buildings of architectural pretension, such as the temple with its courts, or the royal palace.

Etruscan temple-planning was quite different from that of the Greeks, and the Romans followed the Italian fashion down to the close of their history. Though they borrowed at a later time from the Greeks the Ionic and Corinthian Orders, yet, as may be seen, for example, in the Maison-Carrée at Nîmes, in plan and in substructure the temple remained true to native traditions.

Now, until the last two centuries of the Republic, the public buildings of Rome, as distinct from such structures as walls, gates, and conduits, were confined to temples in the columned style. The residential city itself, rebuilt very hurriedly and of poor materials after the Gallic invasion of 390 B.C., remained mean of aspect, with narrow tortuous streets flanked by houses of crude brick or rubble roofed with shingles—streets that till 174 B.C., it appears, were not even paved. The work of civic improvement, begun by the laying down of the first great aqueducts already noticed, received a great impulse after the conclusion of the Punic wars. It was then that the Romans first came directly into contact with Hellenic civilisation, first in Sicily and then in the mainland, and Greek influence began to make itself potently felt in art. It is interesting to observe the manner in which this influence was exercised. The old Greek tradition of civic architecture, illustrated, for example, by the works of the age of Pericles, was one of which it would be well to take note. Temples and other sacred buildings, including the portals of sacred enclosures like the Acropolis of Athens, were, of course, all-

important. On the other hand, two classes of buildings, prominent in modern times as well as in the later classical epoch, were not taken into account at all; these were private houses, which were to be kept in Republican simplicity, and covered halls of assembly, which were not needed or thought of. The secular tasks offered to the architect were those connected with the general amenity of the public places of the city used by all the citizens in common. In the age of Pericles new quarters or new cities, such as the Peiræus, or Thurii in Southern Italy, were laid out with straight streets crossing each other at right angles—a fashion borrowed from the ancient cities of Mesopotamia—and with ample open spaces bordered by porticoes. Harbours or river-quays received especial attention, and were also lined with porticoes, while public gardens and gymnasia were carefully laid out and supplied with the ubiquitous colonnade. Gatherings of the people for business or festivity were held in the open air, in the market-place, where porticoes would provide shelter from rain and wind, or in special meeting-grounds like the Pnyx at Athens. When it was needful to sit to see a performance, the sloping side of a hill bent into a natural hollow was selected. The racecourse was the floor of the valley between two slopes.

Such a Greek city could be laid out at little cost of money, but was distinctly the work of intelligence. Not gold, but thought was spent upon it, and in it architecture became the rational and dignified expression of the municipal life of the community. The architect, confined too much in modern times to single buildings, has seldom the opportunity of giving effect to the civic idea in works on such a scale and on a plan so ordered.

This Greek idea of the treatment of a city—or this *Oriental* idea perfected by the Hellenic intelligence—was transplanted to Rome about a century and a half before the end of the Republic, and became the guiding principle of the reforms of the last age of Republican and the first of Imperial Rome. It inspired Fulvius Nobilior to free the Forum from the slaughterers and market-men, and to appoint them elsewhere a regular mart, with porticoes, a round slaughter-house, and all needful offices; and Paulus Æmilius to line the muddy and crumbling Tiber banks with stone quays and warehouses, and so create an “emporium,” the form as well as the name of which was doubtless borrowed from the “emporion” of the Peiræus by Athens [H. Jordan, *Die Kaiserpaläste in Rom*, p. 13]. At the same time, the first step was made towards the proper embellishment of the Forum itself. The rows of low shops or booths which surrounded it began to be replaced by galleries, from the upper storeys of which the populace could survey the business or the festivities of which it was the scene. The basilica, the first example of which was erected by the elder Cato in B.C. 184, was, as the Romans state, only an extension of the Forum. It was not in its essence a covered building, but an enclosed space surrounded by colonnades and used for the same purposes as the Forum itself. The idea that it possessed a vaulted apse is a mistake contradicted by all existing evidence, and only maintained through its connection with the traditional though erroneous view of the origin of Christian architecture. The grand schemes for the embellishment of the regions round the business

centre of Rome, which were set on foot by Julius Cæsar and carried out by successive Emperors till the time of Trajan, were all inspired by this same idea. They consisted in laying-out new places for meeting and business, surrounded with porticoes and supplied with temples and other public monuments. All this went on, it will be seen, on the old Hellenic lines, and gave no occasion for any new experiments in the use of the vault, though the Cæsarian age introduced the arcade supported on pillars side by side with the older post-and-lintel colonnade. The immense increase in private luxury which marked the last age of the Republic, and upon which Pliny gives details, resulted in the growth of private houses to palaces, their architectural forms remaining, as may be seen in the Imperial ruins in the Palatine (at first, at any rate), substantially the same. Additions in the Hellenic taste were made to the old Roman house, and were called by Greek names, while Greek columns and slabs of marble were imported for their support and adornment. The residential part of the city, occupied by the middle and lower classes, remained as it had been until its rebuilding after the fire under Nero. On the other hand, a new quarter was rapidly pushed out beyond the Capitol into the originally uninhabited Campus Martius; and of this, as it appeared in the reign of Augustus as a great quarter devoted to temples, parks, and colonnades, Strabo has left a brilliant description [*Geog.* v. 3, § 8].

The outward aspect of Rome was thus gradually transformed on Greek principles of civic amenity, the architectural form of the colonnade being everywhere dominant.

I will now turn to consider the use of the arch in this later period of the Republic. The multiplication of aqueducts supported on arches, which conveyed the supply to the upper levels of the hills, was a feature of the age, and Strabo remarks that in works of this kind the Romans far surpassed the Greeks [*Geog.*, *l.c.*]. In carrying these aqueducts through the town, streets had frequently to be crossed; and, in accordance with the tendency of the times, it became the custom to embellish these arches with mouldings and impostes, and to give them an architectural character. The city-gate was, as we have seen, enriched in various ways both in Etruria and Assyria, and there can be little doubt that the gates of Rome had shared in the general embellishment of the city in the age under consideration. From these gates and from the adorned arches of the aqueducts proceeded now the new and specially Roman form of monument, the commemorative or triumphal arch. As early as 196 B.C., according to Livy, one Lucius Stertinius devoted certain spoils of victory to the erection of two such arches in the cattle market, and one in the Circus Maximus, all being embellished with gilded statues, imported no doubt from Greece [Liv. xxxiii. 27]. Another was erected and similarly adorned by Scipio Africanus in 190 B.C. [Liv. xxxvii. 3]. Of the triumphal arch to the permanent honour of a successful general or administrator, there is an example, probably the earliest [121 B.C.], in the arch of Fabius, fragments of which still exist. In the Imperial age these became common, but the form remained essentially the same, and involved only the use of the round arch or short vault of hewn masonry.

The structures with which were connected, in later times, the great domes and

vaults so characteristic of the style of the Empire were of a different nature from those hitherto under consideration. They were theatres and amphitheatres with great bathing-establishments or *Thermæ*, all of which were distinctly buildings for luxury, and were opposed to the traditions of the Republic. The senate had interfered in the later Republican period to forbid the maintenance of a permanent theatre with seats in either wood or stone [Liv. *Epit.* xlviii.]; and when the celebrated Pompeius built the first stone theatre in 55 B.C., he had to connect it with a temple of Venus in order to secure a sanction for his work. This stone theatre of Pompeius is of special interest as presenting an early example of the so-called Roman Order, in which an arch appears enclosed by columns and entablature. A little before, about 70 B.C., the same form appears in the frontispiece to the massive substructures of the Capitol, the so-called *Tabularium*, overlooking the Roman Forum; and these two instances of its use are the earliest of which we have any knowledge. A consideration of these buildings will throw much light on the architectural use of the arch at this period, as distinct from its earlier appearance in gates, bridges, and aqueducts. In both these instances one has to deal with substructures, for in the Roman theatre and amphitheatre artificial supports had to be found for the ascending tiers of seats, which were not, as in the Greek theatre, always constructed on the side of a hill. For such substructures the Romans had learned the fitness of the weight-carrying arch, and naturally employed it here. The difficulty was how to treat the outside elevation. The common Græco-Italian tradition, which has been already noticed, only recognised the post-and-lintel as the constituent elements in an elevation. As Semper has pointed out, the classical builders treated the wall as a screen for purposes of enclosure, not as a supporting member. The wall, as now known, broken with arcades and windows, and crowned with a cornice, was, as Semper shows, the creation of Renaissance architecture; in the pure classical style, an elevation without column and entablature could not be conceived of. If height were needed, the post-and-lintel was repeated in an upper storey, as in the portico of King Attalus at Athens. If a new form, like the arch, was admitted at all, it would only be admitted side by side with the older elements. It might actually, as in these substructures, do the work of support; but the column must still be there, and still in appearance be the sustaining member. Hence, in buildings like the theatre of Pompeius (the elevation of which was repeated in the still existing outer circuit of the theatre of Marcellus) and the substructures of the Capitol, the arch is seen, as it were, creeping upwards from its original use underground, and taking its place as a constituent element in an architectural elevation. Where it thus appears it is as an intruder, a new element, forcing itself in by the side of the post-and-lintel forms. The old view, therefore, about the Roman Order reversed the sequence of facts. That Order does not consist of a Greek facing added to a native arched construction, but of arcuate forms introduced on engineering grounds among the traditional native forms of the column and architrave.

Here, then, the arch for the first time becomes a distinctly architectural feature in a great building, appearing side by side with the forms that had hitherto borne sway,

and prepared to take upon itself a new round of duties; and this is just about one generation before the erection of the dome of the Pantheon—the widest, the grandest, at any rate the most stable, if not the most scientifically constructed, vault of masonry that the world has ever seen.

Is there not something here that excites a natural feeling of surprise and that calls for further investigation? A considerable space has been occupied in this Paper with the history of the early use of the arch at Rome, because, without a clear idea of that history, it is impossible to see how much or how little truth there is in the older view that the Romans of the early times practised vaulting over large spaces, or that they tried extensive experiments with the arch with a view to its use on this colossal scale. Do we sufficiently estimate the significance of the almost complete silence of Vitruvius in respect to all this apparatus of vaults and arches in stone and brick and concrete, with which his contemporaries should have been busy if they were preparing to vault the dome of the Pantheon? Could all the necessary work have been going on at Rome for the last century of the Republic, and Vitruvius have known or cared so little about it? The very materials so characteristic of this work he hardly mentions.

Is not the conclusion forced in upon our minds that experiments in these materials and these forms must indeed have been made for generations before the Pantheon was built, but that Rome cannot have been the theatre of them? Do we ask where that theatre is to be sought? The answer comes naturally to those who have traced in thought the architectural development of Rome under the later Republic, and noted the extent of the influence of Greece over her architecture and art. If Greece had been for a century and a half the acknowledged mistress of Rome in all that appertains to these, where else, if not to Greece, should we look for the source of this new departure which marked the age of Pompeius and of Octavian? It is even stated that Pompeius copied his theatre from one he had seen in the Greek city of Mitylene [Plut. *Pompeius*, xlii.]. Only be it understood that, when we speak of Greece in this connection, it is not the Greece of Athens, Sparta, or Corinth that we must have in mind, but that larger Greece, the great Hellenistic world created by the conquests and settlements of Alexander and his successors.

Here, again, a debt of gratitude is owed to Gottfried Semper, who was the first to bring prominently into view the important subject of Hellenistic architecture and art, as distinct from that which is strictly Hellenic and belongs to the older Republics.

It is somewhat unfortunate that the attention of students of antiquity in this country has been so little attracted to this interesting phase of Greek life which followed on the conquest of the East by Alexander of Macedon. One reason of this is the curious attitude adopted towards Alexander and his work by the historian of democratic Greece, Mr. George Grote. Absorbed in contemplating the purely political aspect of the life of the Republican cities, Mr. Grote, and the scholars whom Mr. Grote has trained, exhibit little sympathy either for the poetry of legendary, or for the restless active life of Hellenistic, Greece. Yet what sort of an imagination can that be which refuses to be kindled at the name of Alexander of Macedon—the ideal youth of historical

Hellas (so Hegel has named him) who recalls at the close of the annals of Greece that ideal youth of poetry with whom her records open, the Achilles of the *Iliad*! At a time when, for generations past, Persian craft and Persian gold had been playing their corrupting part, and the Great King had become practical arbiter of the quarrels of the fallen Republics—at a time when, to all appearance, the political development of Greece was at an end, Alexander gathered all that was strong in the national life into his single grasp, hurled himself against the ancient foe, and made Hellenic influence supreme over the whole nearer East. Then ensued an era of the founding of new cities, centres of Hellenic life and culture, in Egypt and Syria, in Asia Minor, in Mesopotamia, and even across the highlands and plateaus of Central Asia to the gates of India. The more distant of these settlements were no doubt soon swallowed up by surrounding barbarism, or by the advancing power of the Parthians; but the cities which formed a part of the kingdoms of such successors of Alexander as the Ptolemies of Egypt, the Seleukids of Syria and Mesopotamia, or the Attalids of Pergamon, remained permanent centres of Hellenic life down to the later days of the Roman Empire.

And how keen, how varied, was that life! With what energy men threw themselves into the new tasks of the time! What genius was evolved amidst the turmoil of wars, the quickening flow of commerce between East and West, the new currents of thought and new stir of ambition in literature and art! It was not, it is true, an age of the highest kind of achievement in these fields. Hellenism produced no Pheidias, no Sophocles, no Plato; yet there was work of great and permanent value accomplished by the men who were thrown to the surface in the eddies of social and political life. One day there came before Alexander the Great a man of tall stature and noble presence, clad in the fantastic garb of a Herakles. He was a Macedonian architect, he said, and he had a plan for the king. He would carve Mount Athos into his royal image, and set a city of ten thousand souls in the hollow of his hand. Alexander accepted his services, but employed him on the nobler task of planning out his new world-capital, Alexandria. Deinocrates executed the task in a manner which excited the liveliest admiration. At the head of the deep bay which formed the new port to the east of the Pharos he grouped the finest public buildings of the city on the three sides of a spacious open place. The whole extent of the town was traversed for more than a league by a broad street 100 feet across, intersected at right angles by a wide boulevard with a row of trees along the centre. Each principal street was bordered with porticoes, and where they met was formed a spacious circus. It seemed a journey, exclaims a classical writer, to traverse the whole length of the main avenue; and so splendid and so various were the public buildings and other objects of interest displayed on every side that the eye was wearied in beholding them [Achilles Tatius, v. 1]. The prevailing system here, too, was the traditional Hellenic—streets at right angles, open places bordered with porticoes, public buildings in well-selected positions, and spaciouly planned groves and gardens surrounded with colonnades. Such was Alexandria, the acknowledged rival of Imperial Rome at the epoch of her utmost magnificence; and even at the time of its downfall, in the seventh century of our era, so magnificent that

its Arab conqueror could not find words to describe it, and could only report in round figures that he had found in it "4,000" palaces, "4,000" baths, "400" circuses, of royal splendour and extent.

Alexandria was only the first and greatest among a number of Hellenistic cities, some of which, like Antioch or Seleukeia, rivalled it in extent and beauty. It is of special interest for the present purpose because certain facts are known about its architecture which have a bearing on the question under consideration. Seleukeia upon the Tigris, in Mesopotamia, has also a special interest for the student of architectural history, and may claim a word here.

Seleukeia, founded not far from the ancient Babylon by Seleukos Nikator some time before 300 B.C., was placed, like so many Hellenistic cities, at the exact spot in its district most favourable for commerce. It lay where the lines of trade from Persia and the further East converged on the Mesopotamian valley, before they crossed the strip of desert towards the coast of the Levant, and it grew rapidly in wealth and power. Before its short history of about 500 years was over, it had won for itself the appellation "Seleukeia, greatest of cities" [Sallust, *Frag.* lib. iv.], and embraced a population numbering, according to Pliny, 600,000 souls [Plin. *Hist. Nat.* vi. 26]. And it was a Greek city, though of course with a mixed population. Tacitus states that in its decline "it did not fall away into barbarism, but remained faithful to the memory of "its founder" [Tac. *Ann.* vi. 42].

Now the interest of Seleukeia to the architectural student is obvious. Here was a Greek city built in regions where the materials essential to old Greek methods of construction were not available. Trabeate construction demands good building-stone and wood, or, at any rate, one of the two materials, while in the Euphrates valley, for thousands of years, the only building-stuff available in any quantity was brick, made from the river mud, and sun-dried or baked in the kiln. Seleukeia, like Ktesiphon, and like Baghdad in later times, was built largely out of the materials supplied from Babylon, which, as Strabo states, was much pulled to pieces for the purpose [*Geog.* xvi. 1, § 5]. The Babylonian builders used only bricks, with asphalt for mortar, and with these not only had the great Babylonian palaces been erected, and perhaps vaulted, but the famous hanging-gardens had been supported on the vaulted substructures described by Strabo, while, owing to scarcity of timber, the houses had been arched over in the same material [*Geog.*, *l.c.*]. Such materials and, as an almost inevitable consequence, such forms of construction must be assumed for this magnificent and wealthy Greek city of Seleukeia, as large and busy as Liverpool, and the seat of government of a vast province. It must be assumed that is, that, as at Babylon, the houses were covered with vaults of brickwork, while the necessity for the employment of the arch must have been pressed on the architects at every turn.

It is not easy to find any direct notice of the buildings of Seleukeia; but such a notice exists in the case of Alexandria, and it is one of considerable interest. Writing about 50 B.C., that is, before the Roman period in Alexandrian affairs had commenced, the historian of Cæsar's Alexandrian war [Aulus Hirtius, *De Bell. Alex.* 1, 5] uses the

following words:—" Alexandria is almost entirely safe from conflagrations because the " houses are put together without any floorings or timber, and are constructed with " vaults and covered over with concrete or stone slabs." And again :—" Alexandria is " almost completely hollowed out below ground, and is built over cisterns communi- " cating with the Nile, by which water is brought in for the service of the private " dwellings."

These cisterns still exist, where they have not been filled in during the present century, for the *savants* of Napoleon's Egyptian expedition, about the year 1800, had the opportunity, now lost for ever, of studying the site of the ancient city still free from the modern houses which now almost cover it, and reported that underground cisterns were to be found almost everywhere. At the time of their survey 308 of them were still in use supplying the needs of the then native population of some 8,000 souls; but outside the circuit of the walls of the Arab city, where the ground had remained waste since classical times, the same structures were everywhere apparent.

There seems no ground to question the Hellenistic origin of the numerous smaller cisterns described in the survey as existing near the shores of the port, and built and vaulted in brick with a liberal use of a mortar so excellent in quality as to withstand perfectly the action of the sea-waves. Enormous masses of brickwork and mortar, with constructions in concrete as well as in stone masonry on the largest scale, occupied sites where there is no reason to doubt they were placed under the Ptolemaic kings in the second or first century before our era [*Description de l'Égypte*, vol. v., Paris, 1829].

Again, of the Serapeion at Alexandria, a grand edifice of the Ptolemies, it is stated by a writer of the fourth century A.D., that it was raised high in the air, not by nature, but by the hand of man, all the lower part up to the level of the platform, an ascent of 100 steps, being supported on vaults, while within the vast substructure were corridors and arched chambers employed for various functions [Rufinus, *Hist. Eccl.*, ii. 23]. The French explorers found a mass of masonry and of antique brickwork which they believed to form part of these substructures, though it need hardly be said that the topography of ancient Alexandria is still largely a matter of conjecture.

Putting together, then, the statements of Aulus Hirtius and Rufinus, and the accounts of actual remains at Alexandria, there is pretty clear evidence of a use of the vault in brick- or rubble-work in this greatest of the Hellenistic cities, during the last centuries before our era. It may be observed, also, that the form of the vault referred to is much nearer to that characteristic of Imperial Rome than are the Roman cut-stone arches of gates, bridges, and aqueducts. The latter are *weight-bearing*, not *covering* arches, like these of the Hellenistic metropolis. It is worth noting that the Roman term for the "arch" was *fornix*, a good old Latin word used in this sense by the poet Ennius about 200 B.C., whereas the "covering vault" of the apartments of the Thermæ was called by the name *camera* or *cameratio*, this being not a Latin but a Greek word; and, as Professor Jordan has pointed out [Jordan, *Topographie der Stadt Rom*, i. 30, note], not an Attic or old Greek word, but one which probably belongs to the Hellenistic East. Ennius [apud Varro, *L. L.*, v. 3.] writes of "Cœli

"ingentes fornices." Cicero [*De Oratore*, iii. 40] criticises this use of the word, saying, "in sphæra forniciis similitudo non potest inesse." This seems to imply that, in Cicero's time, *fornix* meant only "arch," and could not be used for the spherical vault. For this, a foreign importation (?), a foreign term "camera," was adopted. *Fornix* is, however, sometimes used by Latin writers in the sense of "vault."

To show that Alexandria was certainly not alone in the possession of vaulted structures, it is only needful to quote the instance of Pergamon. At Pergamon, in Asia Minor, a great Hellenistic capital, the German explorers have found evidence of an early use of the vault in stone. Professor Adler, a strong believer in the Hellenistic vault, stated some years ago that in the third or certainly in the second century before Christ, the inhabitants of this region had attained proficiency not only in the barrel-vault of stone, but also in the vaulting of intersecting barrel-vaults, which brings us very near to the cross-vault, the exact history of which it is not easy to trace [*Abhandlungen d. Berlin. Akad.*, 1872].

In what direction do these indications appear to lead? The facts about ancient architecture which have thus been passed in review suggest an hypothesis or a theory which may now be briefly described. It is only an hypothesis, because the known facts which bear upon it are at present few; but there is no better way of securing the discovery of more facts in a case of the kind than by showing the significance of the few already known. The hypothesis is that what is known as the architecture of Imperial Rome was, in all those respects in which it went beyond the old classical traditions, the creation of the great Hellenistic cities, where works had to be carried out under the same conditions and with the same materials and processes that are found in use later on at Rome. These cities had by at least two centuries the start of Rome, and during those centuries may have been preparing the way for that development of building construction which begins, to all appearance suddenly, with the Pantheon of Agrippa.

"Under the same conditions and with the same materials and processes." A few words in justification of this will suffice. Let us remember that the great edifices of luxury, especially the Thermæ and the theatres, were neither required nor even tolerated in Republican cities, such as was Rome until near the time of Augustus. These Hellenistic capitals were not Republican cities, but royal residences, the seats of dynasties ruling by insecure tenure over populations which had to be continually fêted and kept in good-humour. Their rulers disposed of vast accumulated wealth which had been stored up in the older cities of the Persian Empire, and of large revenues from the commerce for which the settlements had been established. There was no lack of artistic talent among the contemporaries and successors of the brilliant Deinocrates, and certainly no difficulties would arise through old Republican objections to new experiments, or to an increase in the apparatus of luxury. A remark of Strabo's about Alexandria is full of significance. He says that none of the Ptolemies was satisfied with the palace of his predecessor, but added something new for himself, till the promontory of Lochias, the eastern boundary of the new

port, was covered with a line of palaces [*Geog.* xvii. 1, § 8]. These palaces and other public buildings had to be built hastily and built for show, and if any new architectural effect could be contrived in connection with them, there would be all the more praise and reward for the architect. It need hardly be pointed out that these social and political conditions were very much the same as those prevailing at Imperial Rome, though a Nero or a Trajan could, of course, dispose of still larger resources than those at the command of a Ptolemy.

The same may be said of materials and processes. So little remains at Rome from the Republican period that it is difficult to speak with assurance on the materials and processes then in use. Masonry of squared stones was used throughout the history of the city, and remains have survived from the oldest times. For ordinary purposes slighter materials sufficed, and Cicero states that in his time the city of Rome was built of bricks and rubble-work. Such bricks were crude or sun-dried, and Vitruvius shows plainly that burnt brick was hardly known in his time as a building-material, while "no example of brick earlier than the time of Julius Cæsar "is now to be seen in the city" [Prof. Middleton, in *Archæologia*, li. 52]. On the other hand, in the Hellenistic East, especially in Babylonia, the art of building with burnt brick was of immemorial antiquity, and the remains already noticed at Alexandria—if really Hellenistic—would prove familiarity with its use in that city before it appears at Rome. The employment of lime-mortar and concrete passed through many phases in the ancient world. In the form of plastering for the surface of walls it is also of immemorial antiquity; but as a binding material or as artificial stone its use was not general in antiquity. Of all Mediterranean peoples the Phœnicians seem to have been best acquainted with the properties of lime mortar, and they made extensive use of it, especially in Africa, for massive structures of concrete. Writing about 300 B.C., Théophrastus describes the process of burning stones for lime as carried on especially in Phœnicia and Syria [Theophrast. *De Lap.* 64], and among the ruins of the great Punic cities of Africa, such as Carthage, Utica, and Thapsus, there are remains of important monuments executed in concrete. One of the most remarkable of these is the mole at Thapsus, still nearly 1,000 feet long by 36 in width, and with a height above the sea of 8 feet [Daux, *Recherches sur l'Origine, &c., des Emporia Phéniciens*, Paris, 1869, p. 170]. In the work of M. Daux, just quoted, will be found many details about Punic concrete which he professes to distinguish beyond all doubt from Roman.*

The passage from Theophrastus just referred to was clearly written by one not himself very familiar with the various processes involved in the use of lime, and describing them for readers still less informed on the subject. This fact, and the

* See also MM. Perrot et Chipiez, *Phénicie*, p. 354 ff. These writers agree that the Phœnicians used concrete long before they came into contact with the Romans. The mole of Thapsus is certainly Punic. Compare too the second Paper (XX.), by Mr. Alex. Graham, F.S.A., *Member of Council*, on "Remains of the "Roman Occupation of North Africa, &c.," *TRANSACTIONS*, Vol. II. N.S., p. 160, and *Illustrn.* xxxiv. in the same volume.—G.B.B.

prominence he gives to Phœnicia, seem to imply that the classical peoples learned (or re-learned, for concrete occurs in the prehistoric buildings at Tiryns and Mycenæ, and may have been derived from Phœnicia) the uses of lime from the Phœnicians at no very early date. The first use of anything like lime-concrete by the Greeks of which there is any record was in the case of the foundation of the Long Walls at Athens, which, according to Plutarch (*Cimon*, § 13), were first laid by Cimon about 464 B.C. An excellent hydraulic mortar appears to have been used at Athens a little later in the foundations of the docks in the small harbour of Zea by the Peiræus, where Boetticher reports that the mortar has in many places lasted better than the stones themselves [Boetticher, *Die Tektonik der Hellenen*, 2te Aufl., p. 12]. Construction of similar excellence appears among the ruins of ancient Alexandria. The bricks there, according to the French report, were “unies par de si bon mortier, que les pans énormes que la mer a renversés sur elle-même en sapant la côte, et qu’elle bat sans cesse depuis des siècles, conservent toute leur intégrité” [*Description de l’Égypte*, Paris, 1829, v. 272]. The same report speaks of a “plan incliné” descending to the sea near Cape Lochias: “Il est formé de pierraille et de mortier. Ce mélange a acquis une telle dureté, qu’on a de la peine à se persuader que ce ne soit pas le rocher lui-même” [*l.c.* p. 274]. It is possible, of course, to argue that these and other such remains do not belong to Hellenistic, but rather to Roman and Byzantine Alexandria; but against this there is to be set, first, their great extent and wide distribution over the area of the ancient city which the French *savants* were able to explore; and, secondly, the fact that Aulus Hirtius speaks of vaults, terraced roofs, and cisterns, which imply the use of lime-mortar, at a time before the Romans had begun to control Alexandrian affairs.

With regard now to the use of lime mortar and lime concrete in the West, there is an instructive notice in Livy [xxi. 11, § 8], who says of the walls of Saguntum, that they were easily demolished, “because the stones were not compacted with lime, but “bedaubed with mud after the fashion of ancient building.” Rubble walls did not therefore imply necessarily the use of lime mortar (though such must have been present in the weight-carrying vaults at Alexandria), and at Pompeii “a whole series of “houses of an early period” exhibit this technique, which “must formerly have been “altogether common” [Nissen, *Pompejanische Studien*, p. 42]. Doubtless the Rome of Cicero’s days was largely built of rubble of this kind [Cic. *De Div.* ii. 47]. The exact date of the earliest use at Rome of lime-mortar and lime-concrete is not easy to fix, as authorities differ as to the age of so many pieces of old Roman construction. The process of lime-burning was, however, familiar to the elder Cato, who describes it in his *De Re Rusticâ*, written in the first half of the second century B.C. “From the “first century B.C. onwards it was the chief material used for the walls of buildings at Rome” [Middleton, in *Archæologia*, li. 47]. Now, however characteristically Roman was this use of lime-concrete, there was no word for “lime” in the Latin language, except the derived term “calx,” from the Greek *χάλιξ*. This may be taken as evidence that, like so many other pieces of technical knowledge, that of the use

of lime was imparted to the Romans by the Greeks. Another linguistic consideration is worth mentioning. As every one knows, the excellence of Roman mortar was due not only to the indispensable lime, but to the special sand or earth with which it was mingled. This was a product of the country round Rome, where immense beds of it occur; but it was not called "Roman earth" or "Roman sand," but "dust from Puteoli," "Puteolanus pulvis," a name which still survives in the modern "Pozzolana." Vitruvius does not know it as a Roman, but rather as a Campanian, mineral, and introduces it to his readers in the following terms:—"There is a kind of earth the natural qualities of which are most remarkable. It is produced in the regions about Baia and in the territory of the towns about Mount Vesuvius;" and then goes on to praise it for its hydraulic properties when formed into mortar with lime [Vitruv. ii. 6, § 1]. Strabo, who wrote in the time of Augustus, specially signalises the use of this hydraulic mortar in the works of the magnificent port at Puteoli [*Geog.* iv. 4, § 6.] These, he says, were rendered practicable by the nature of the sand, which, when mixed with lime, set with the firmest possible consistency, so that moles could be pushed out into the sea. It is clear that the qualities of "Pozzolana" were originally discovered and tested in other places than Rome, where the beds of this excellent material were not tapped till it had become famous from its use in Campania and was a recognised article of export from Puteoli. It must not be forgotten in this connection that a peculiarly close commercial intercourse was carried on between this Italian port and Alexandria [Strabo, xvii. 1, § 7].

If an examination of materials leads us in this manner to look away from Rome for the origin of Roman Imperial architecture, the same result follows from an investigation into processes of construction.

The characteristic structures of Imperial Rome are formed of concrete, faced, in the case of walls, with small stones, or more commonly with burnt brick, over which again was an outermost coating of stucco; and in the case of vaults with stucco alone. The brick or stucco facing was extremely thin in comparison with the great mass of concrete forming the wall or vault, but the structures present this remarkable peculiarity:—in the brick facing of the walls there occur commonly, as in the outer skin of the drum of the Pantheon, what appear to be discharging arches. These arches do not, however, penetrate more than a few inches into the thickness of the wall, and can have had no constructive use; while, as they were concealed on the outside by the coating of stucco, they cannot have been decorative. Further, behind the stucco facing on the inner surface of vaults and domes, and imbedded in the concrete mass, there are found certain ribs of brickwork, formed sometimes of a succession of cells of brick like a row of cells in a honeycomb, and sometimes of a string of single bricks. These again, like the discharging arches, only penetrate some inches into the mass, while not only have they in themselves no ornamental function, but are even completely ignored in the decorative scheme of surface-treatment, the sunken cassettes cutting into them at times as if they were simply part of the general mass.

About the existence of these curious constructive features there is no question, but the problem of their origin and significance is one of no little difficulty. Two diametrically opposed views on the subject have been recently stated by high authorities, but it is fortunate that the main contention in this Paper may claim support as well from the one as from the other. According to one of these views this system of brick ribs or cells is a highly scientific invention intended to facilitate construction by minimising the use of wooden centering; according to the other, they are entirely superfluous, and can have had no effect at all upon construction. There is no occasion here to take sides in this controversy, as either view would, if proved correct, make for the present argument. It is enough to state them, and to show the bearing of each upon the theme before us.

The one view is that brought forward in the interesting works by the French engineer M. Choisy, *L'Art de Bâtir chez les Romains* (Paris, 1873) and *L'Art de Bâtir chez les Byzantins* (Paris, 1883), which have been noticed by Professor Aitchison in the JOURNAL OF PROCEEDINGS [Vol. V. n.s., p. 305]. In the latter of these works M. Choisy seeks to prove the existence of a common tradition of arch and vault construction among the peoples of the nearer East, from the ancient Assyrians down to the Byzantines of the Lower Empire. A feature of this tradition is seen in ingenious processes, by which the use of centering could be minimised or altogether dispensed with, and readers of M. Choisy would do well to illustrate what he says by a comparison with Mr. Simpson's valuable Paper on "Mud Architecture,"* as well as with Place's great work, *Ninive et l'Assyrie*. In *L'Art de Bâtir chez les Romains*, its author, though not deriving Roman construction from Oriental or Hellenistic sources, yet endeavours to show that it proceeded all along on this same system of avoiding unnecessary centering which was in vogue in the East, and his readers find themselves naturally brought to the conclusion that there was, after all, only one great tradition of vault construction, formed originally in the East—probably in ancient Babylonia—and spreading thence—first, perhaps, through the Etruscans, and then through the Hellenistic Greeks—to Rome and to the West.

In M. Choisy's demonstrations the engaged ribs or cells of brickwork already mentioned play an important part. According to his view these were put together first over a light centering of wood, and formed, when completed, a sort of skeleton or framework that could not only support its own weight, but served as additional centering to sustain a skin of concrete laid all over the surface of the intended vault. The centering for the concrete skin was thus partly the original woodwork and partly the brick ribs, to which the mortar adhered during the process of setting. The wooden centering was finally removed, but the brick ribs remained always embedded in the concrete. If this was actually the process employed, it would be one which accords with Oriental practice as described in the works just referred to,

* TRANSACTIONS, Vol. 3, XXIX. "Mud Architecture: Notes made in Persia and other countries," by Mr. William Simpson, R.I., *Hon. Associate*, pp. 57-80.

as well as with that *economy in preliminary processes* which was traditional in all the arts of old time. Whereas the modern sculptor—to take one illustration—works out his idea to the full size in clay, has the work cast in plaster, and then copied in marble, or else moulded in sand for bronze-casting, the ancient statuary contented himself with a sketch in clay of small size (as did Michelangelo in the case of his colossal “David”), from which he went on at once to attack the marble block, or to model out his work—in fireclay, with an outer skin of wax—for reproduction in metal. So we should be prepared to find the ancient constructor dispensing with the complete, heavy, and costly mould of timber, the use of which, on the scale of the stupendous dome of the Pantheon, Viollet-le-Duc considered to be impracticable [*Dictionnaire de l'Architecture Française*, art. “Voûte”], and attaining his end by more expeditious and economical means. If, however, this was the case in the matter before us, and M. Choisy is right in his main contention, then it is quite clear that the Romans cannot have invented and perfected the system involved, in the short interval which elapsed between the introduction of these materials (burnt-brick, lime, and pozzolana) into Roman building-practice, and the construction of the dome of the Pantheon before B.C. 27. It will not avail to reply that this system was not used in the Pantheon, but was subsequently evolved, for there is conclusive evidence that its cupola actually possesses these curious constructive features. Among the works published under the name of Piranesi is one entitled *Raccolta de' Tempj Antichi*, the second part of which was issued in 1790 by Francesco Piranesi, and contains sundry engravings of the Pantheon, based, doubtless, on the drawings of the elder Piranesi. Tavola xxviii. is headed “Dimostrazione di alcune parti dell' opera “laterizia, che costruisce il Panteon,” and exhibits a portion of the intrados of the cupola freed from its coating of stucco, and furnished with a network of brick ribs and arches embedded in the usual manner in the concrete [see diagram, p. 169]. It is of no use to suggest, as has been suggested by Viollet-le-Duc [*Dictionnaire*, art. “Voûte”], and repeated by Professor Durm [*Baukunst der Römer*, p. 184], that what Piranesi refers to is the *outer* and not the *inner* coating of the dome, for he not only gives the engraving just noticed, but also one showing the scaffolding which was arranged in 1756, “per ristaurare la cupola del Panteon.” A glance at these plates shows at once that the work in question was *inside* the dome, and, unless one of the Piranesi has been guilty of a gross and deliberate falsehood, we are forced to accept in the main the account which he gives. The actual form of the network of ribs is of no moment. If such a network exists in the earliest of the great concrete vaults of the Empire, it obviously represents a tradition of construction elaborated elsewhere than at Rome, and handed on ready-made to the dwellers on the Seven Hills.

The above is based on the supposition that M. Choisy's brick ribs were, as he believes, of actual constructive use in saving the expense of centering; but the French author's views have by no means met with universal acceptance. Since he wrote, there have appeared two authoritative works dealing with Roman architecture especially

from the technical side—Professor Durm's *Baukunst der Römer*, and Professor Middleton's *Ancient Rome* in 1885 (new edition, 1888), to which must be joined his paper in *Archæologia*, vol. li., "On the Chief Methods of Construction used in Ancient Rome." The former writer accepts in the main M. Choisy's demonstrations, though he points out that his drawings represent Roman work as neater and more regular than it actually appears [Durm, *Baukunst der Römer*, p. 169], while the latter makes no mention in his book of his French predecessor, and dismisses him in a summary sentence in a note to the paper in *Archæologia*. In Professor Middleton's eyes the Roman vault was one solid mass of concrete, without any elasticity and without any lateral thrust, and "carried its space with the rigidity of a metal lid" [*Archæologia*, l.c. p. 56]. He does not believe that the brick ribs or cells in question had any manner of constructive use, though at the same time he offers no hypothesis to account for their actual appearance.*

But why should such a proverbially practical people as the Romans have devoted time and skill to pieces of construction that served no purpose either useful or ornamental? Are we not in the presence here of a difficulty greater even than that put before us when asked to accept all M. Choisy's ingenious demonstrations? Is there any other way out of this difficulty than to accept the following hypothesis, to which, if Professor Middleton's view be adopted, we seem to be constrained? If these pieces of construction have no function to perform, if they are also hidden from view, and ignored, or even, as must be the case in the interior of the Pantheon, contradicted, by the decorative forms employed upon the surface, then I am tempted to regard them as nothing more nor less than *survivals*—forms which at one time had a use and meaning, but which are retained by a sort of instinctive conservatism when their meaning has long been lost. Instances of such survival are not uncommon in the history of the arts, and explain many a puzzling anomaly. In this case it would be necessary to suppose that in the Hellenistic East the method of construction with a network of brick cells and concrete filling had been perfected after many trials, and

* Professor Middleton [*Archæologia*, l.c.] is hardly fair to M. Choisy when he states that his "elaborate drawings . . . are wholly misleading from their not recognising the superficial character of these brick arches in the concrete vaults." What M. Choisy maintains is that the brick arches helped to sustain the first comparatively thin skin of concrete spread over the centering, and that when this skin had set round the brick ribs the whole formed a complete vault which might afterwards be thickened at will. On the opposing theory the concrete wall or vault should be absolutely homogeneous, cast at one gush between timber framings or over "wooden centering of immense size and strength;" but Professor Middleton himself adduces two considerations which would seem to favour M. Choisy's view that the concrete was always spread in successive layers. One is the regularity of the lie of the larger stones embedded in the concrete, which makes it seem "that these larger stones were thrown in separately by hand, not poured in at random as was the rest of the mixture" [*Archæologia*, p. 49], and the other the fact that in these concrete structures "we find in most cases single courses of large tiles (*tegulae bipedales*) about 1 foot 11 inches square, introduced at regular intervals of from 3 to 5 feet, passing through the whole thickness of the wall" [p. 53]. Both these facts favour the idea of successive layers in the work, and, if this be conceded, the brick ribs might play an important part in relation to the first layer. The "bonding courses" of large tiles, which occur also, according to Professor Durm [*Baukunst der Römer*, fig. 166], in the cupola of Minerva Medica, would certainly destroy homogeneity. It is clear that more work still remains to be done before the processes of Roman construction are fully understood.—G. B. B.

had then been handed on to the West. The Romans adopted the forms ; but as, owing to the special excellence of their materials, they did not need so scientific a system of construction, they retained them as a mere *caput mortuum*, without either reason or significance. It is clear, therefore, that, whichever view be taken of Roman construction, the argument of this Paper can only be strengthened.

Turning for a moment from structure to ornament, there are the strongest reasons for locating in the Hellenistic cities, and probably at Alexandria, one of the most characteristic forms of decoration employed in Imperial Rome, that of veneering brick or concrete structures with marble slabs. The use of costly marbles was coming into fashion at Rome, as Pliny states, in the last age of the Republic, and there is a curious piece of evidence that the custom was imported from abroad. If with the assistance of Dr. Mau [*Geschichte der decorativen Wandmalerei in Pompeji*, Berlin, 1882, and *Pompejanische Beiträge*, Berlin, 1879] the history of Pompeian wall-decoration be studied, it will be found that the oldest form of it was the imitation in coloured stucco of slabs of variegated marbles [Mau, *Geschichte*, p. 108]. The employment of real marbles was at the time evidently a foreign luxury, very attractive, but too costly for general use. It was reserved for the Romans of the age of display to introduce the technique itself, which was one exactly suited to the genius alike of the Hellenistic and of the Roman Imperial period. Alexandria was a famous emporium of costly marbles,* and the relations of its port with those of the Campanian coast were, as has been shown, particularly close. The influence of Alexandria on Italian wall-decoration is proved also by the prevalence of Egyptian "motives" in the mural paintings.

Let, now, any one who has an open mind on this subject re-read, in the light of the hypothesis which has been brought forward in this Paper, the two chapters in Vitruvius dealing with baths and with the Palæstra [Vitruvius, v. 10, 11]. The baths which he describes bear little resemblance to the colossal establishments of Agrippa or Caracalla, but are very like the modest bathing-establishments of the Republican period to be found at Pompeii, where, for example, the men's and women's baths adjoined, and the same furnace and vessels served for both, according to the Vitruvian rule. On the other hand, when reading his description of the Palæstra, which was, he expressly says, *not used by the people of Italy, but was drawn by him from Greek models*, the reader is transported at once within the ample enceinte of the Roman bathing-establishment of the Empire. The proper illustration to this chapter of Vitruvius—the eleventh of his fifth book—is Blouet's restored plan of the Baths of Caracalla. The essential elements are the same in both, though the arrangement of those elements is different. In both there is a square or oblong space surrounded with porticoes provided with Exedrae or alcoves, where rhetoricians may sit and dispute. In both are open spaces laid out with groves or plantations, with walks between the trees and seats set on concrete pavements ; in both the

* Consult [TRANSACTIONS, Vol. IV. N.S., pp. 5-26] Mr. Brindley's Paper on "The Ancient Quarries of Egypt."

Stadion for athletic contests under the eyes of spectators on the grassy banks. Amidst a complexus of porticoes, the plan of which it is not easy to make out from the description, Vitruvius provides for bathing-chambers of exactly the same form and construction, though on a much simpler scale than those in the Imperial Thermæ. He tells of rooms for anointing, of the cold bath for cleansing purposes, of the cold swimming-bath or Frigidarium, and, further, of the vaulted Sudatorium twice as long as it is broad, of the warm bath, and, finally, of the enigmatical Laconicum, constructed, as he had already described it, with hemispherical vaulted cupola. The conclusion seems irresistible that the Thermæ of the Empire are in all their essential elements, including the great vaulted chambers, the creation of the older Hellenistic cities.

In concluding now this Paper,* it may be well to recall again to mind the larger interests of the subject which has occupied the reader's attention. The actual truth, wherever it may lie, about the derivation of the Roman Imperial style is not so

* The argument of this Paper assumes throughout the truth of the received opinion that the building we know as the Pantheon is, in all its substantial features, a work of the Augustan age. This opinion is not a mere theory or matter of tradition; it is based on very clear and cogent evidence, the nature of which may be briefly indicated. The dates of ancient buildings are fixed (1) by documentary evidence, and (2) by the internal evidence of artistic style, especially in details. Two documents have come down to us giving authoritative statements about the age and authorship of the building; one is the inscription on the frieze of the portico, "M. AGRIPPA L. F. COS. TERTIUM FECIT," the other a passage in the historian Dion Cassius, which runs as follows:—

[Agrippa] Τό τε Πάνθειον ἀνομασμένον ἐξετέλεσε· προσαγορεύεται δὲ οὕτω τάχα μὲν ὅτι πολλῶν θεῶν εἰκόνας ἐν [ἔμῃ?] τοῖς ἀγάλμασι, τῷ τε τοῦ Ἄρεος καὶ τῷ τῆς Ἀφροδίτης, ἔλαβεν, ὥς δὲ ἐγὼ νομίζω, ὅτι θολοειδὲς ὃν τῷ οὐρανῷ προσέοικεν. ἡβουλήθη μὲν οὖν ὁ Ἀγρίππας καὶ τὸν Αὐγουστον ἐνταῦθα ἰδρῦσαι, τὴν τε τοῦ ἔργου ἐπὶ κλησὶν αὐτῷ δοῦναι· μὴ δεξαμένον δὲ αὐτοῦ μηδέτερον ἐκεῖ μὲν τοῦ προτέρου Καίσαρος, ἐν δὲ τῷ προνάῳ τοῦ τε Αὐγούστου καὶ ἑαυτοῦ ἀνδριάντας ἔστησε.

"And [Agrippa] also completed the building known as the Pantheon. The reason why it is called thus may be because, together with the principal statues—those of Ares and of Aphrodite—it also contained images of several other deities; but in my opinion the reason is to be found in its circular shape, which gives it a resemblance to the heavens. Now Agrippa desired both to set up therein the figure of Augustus, and also to call the building after his name; but when Augustus declined both of these proposals, then he placed in the building itself the statue of the former Cæsar [Julius], while in the porch he set up images both of Augustus and of himself" [Hist. Rom. liii. 27].

Dion Cassius is a trustworthy writer, who tells us expressly that he was careful in collecting all available materials for his work on Roman history, and his statement about the Pantheon is of the utmost weight and authority. What is it that we learn from him and from the inscription previously quoted? (1) The inscription proves that Agrippa built the portico, and leads us naturally to believe that he also erected the building to which that portico gives access. (2) Dion Cassius assures us that Agrippa built the edifice known in his time as the Pantheon, and draws a distinction between the Pantheon itself and the porch before it. (3) The same writer tells us that this Pantheon was circular, and resembled the heavens, from which circumstance he believed it to derive its name. Now a circular building with a dome resembling the vault of heaven exists, as every one knows, to this day behind the porch built by Agrippa, and a later inscription on the porch makes it certain that it was this building which had the name of "Pantheum." The conclusion is perfectly clear—either the present building is the work of Agrippa, or it replaces a similar building which was the work of Agrippa. What other evidence have we to help us to choose between these two alternatives? There is the internal evidence of style in matters of detail, and this is extremely strong in favour of an early date for the existing fabric, for the great bronze doors with their framing, which give access to the interior, are universally recognised as belonging in style to the Augustan age. There are also various documents relating to the sufferings of the Pantheon through fire, lightning, and decay, and to various measures of restoration adopted by successive emperors. It would take too long to go through these *seriatim*, and it is sufficient here to refer

important as are the broad facts of Hellenistic art and culture which have been too often slighted or ignored. It is sufficient to point to the sculptures from Pergamon, now the glory of the museum at Berlin, to show what Hellenism could achieve in the plastic art. If we have to lament the complete destruction of its architectural glories, we may yet hope that renewed interest in this phase of art may bring to light fresh evidence by which some clearer ideas can be formed upon the question which has been discussed in this Paper. It would not detract from the architectural achievements of Rome if it were proved that to the Greeks belongs the merit of having first raised to monumental greatness the primæval Eastern form of the "camera" or vaulted covering. The Romans laid no claim to originality in the arts. What they could do, better than any other people, was to *organise*, and the organisation of Roman public works must always remain one of the titles to glory of that extraordinary people. From whatever quarter their artistic material was ultimately derived, they employed it in a spirit that was essentially Roman, and stamped their own national character on the architecture of every land from Mesopotamia to Britain. To emphasise the importance of the Hellenistic movement in art need not detract from what was accomplished in the older Greece of the Republics or in the city of the Seven Hills. All that need be asked for is a recognition of Hellenism as marking a distinct phase in architectural development, so that on the page of the history of art, where we read of the achievements of Athens and of Rome, we may henceforth see written also the names of Alexandria and Antioch, of Seleukeia and of Pergamon.

G. BALDWIN BROWN.

[Notes by Professor AITCHISON, A.R.A., *Vice-President*.]

The subjects considered in this Paper are of the greatest interest from an archæological point of view, not only to architects who are naturally desirous of knowing the sources from which Roman Imperial architecture took its rise, but to historians and ethnologists. I think I may fairly say that it is one of the most suggestive lectures that has been given here for many years, raising the questions of the development of the Hellenistic style, the open-air character of classic architecture, the origin and progress of the arch, both as a constructional and as an æsthetic feature; the origin of the Roman Orders; the origin of rubble faced with brick, of Roman vaulting and doming, and of the veneering of buildings with marble; and touching also on the great problem of the Thermæ. Professor Baldwin Brown also adverts to some

those interested in Pantheon archæology to the following two publications, which contain a full treatment of the subject from the standpoint of recent discoveries and theories—Professor Adler, *Das Pantheon zu Rom*, Berlin, 1871; and Rodolfo Lanciani, *Il Panteon e le Terme di Agrippa*, Roma, 1882, published in the *Notizie degli Scavi*, or official account of excavations under Government control, for the months of October 1881 and August 1882. No candid reader who goes through the evidence collected in these treatises will be likely to doubt that, in spite of internal changes which we know have taken place, the building which we visit in Rome to-day is, in all its substantial features, the work of the architect of Marcus Agrippa.—G. B. B.

of the views of Semper, notably to the wall as distinct from the post-and-lintel form, and his view of how the wall was regarded by the ancients. Unfortunately, Semper's voluminous works are still entombed in their native German, awaiting another Ptolemy to have them translated into a readable tongue, provided always that the matter is of the value at which it is estimated by his worshippers.

Modern civilisation comes from the Greeks through the Romans, as the Roman came direct from the Greek. The Romans owed to the Greeks their letters, laws, arms, organisation, and every art and science.

After the Macedonian Conquest the whole world was pervaded by Greeks. The Pope's remark "that there were three elements and *Florence*," might be changed to "*Greece*." The Greek was before everything an artist, and his aim was personal excellence. The Roman was the ideal of the practical man, and in the best times his aim was the supremacy of Rome, and this he had wit enough to see was to be compassed by implicit obedience, perfect discipline, and adherence to rule. One cannot help believing that the greatest man Rome ever produced, Publius Cornelius Scipio, must have had Greek blood in his veins. As soon as fresh excavations and investigations of the Hellenistic buildings are made, new lights will doubtless be thrown on many problems still unsolved. That the employment of Greek architects must have been great up to Trajan's days may be taken for granted, else Trajan would hardly have said that the architects of Rome mostly came from Greece.

I think it can hardly be doubted that the "Roman Orders" came from the Hellenistic buildings of Asia Minor and the islands; it is difficult to picture to oneself a Roman inventing or transforming an art.

As regards the statement* that small domes require no centering: if they are made of fluid mud, it must be laid on branches or wattles; and if the material was firm and the dome flat, a core or centre of earth was probably used, as in making ovens at the present day, unless burnt gypsum was used as cement. Pliny [*N.H.* xxxvi. 59] speaks of its manufacture and use. It is known that Pompey's Theatre was copied from one at Mitylene, and there can be as little doubt that the dome of the Pantheon was enlarged from one seen by Agrippa or by his architect abroad. Vitruvius's description of the Palæstra is believed to be taken from the one at Naples.

Vitruvius is an enigma. He mentions arches, vaults, and domes, though the last are confined to that of the Laconicum and to painted ones. The vaults of the aqueducts of Appius Claudius had been built more than 200 years before the days of Vitruvius, yet he says nothing about the way of building vaults and domes, nothing of the centering required, nothing of the original method of facing rubble walls with the brick triangles, and it is evident that the pozzolana of the Roman Campagna was not used in his days.

* Domes can be built without centering, as we know that of the Cathedral of Florence was, when the pitch is high; and we know that the one at Malta was so done, by rabbeting the bricks. M. Choisy also tells us of small domes being built by there being enough men to hold each brick of a ring until it set; but we want something more than the mere bare statement.—G. A.

The great Thermæ are described by the Professor as buildings for luxury. What is luxury? Take our own Turkish baths as an example; more people use them to cure gout and rheumatism, or as prophylactics against these diseases, than for pleasure. Celsus and Galen prescribe the use of hot-air, hot-, tepid-, and cold-water baths, shampooing, strigilling, and friction with oil in a variety of diseases; and modern doctors have remarked that the Romans showed by their use that they had discovered the important functions of the skin when gymnastic was universal. It could be judged by Julius Cæsar's bequest of oil for the bathers, and by Vitruvius's description, that they were common before the end of the Republic; but we have the testimony of Polybius [Polyb. xxvi.] to their common use in the second century before our era. He states that Antiochus Epiphanes, before 175 B.C., "used also to bathe in the public baths when "they were full of the townspeople, pots of the most expensive unguents being brought "in for him; and on one occasion, on some one saying, 'Lucky fellows, you kings, to use "'such things and smell so sweet!' without saying a word to the man, he waited till he "was bathing the next day, and then coming into the bath caused a pot of the largest "size and of the most costly kind of unguent, called *stactè*,* to be poured over his head, "so that there was a general rush of the bathers to roll themselves in it; and when "they all tumbled down, the king himself amongst them, from its stickiness, there was "loud laughter." I have used Thermæ to express the junction of baths and gymnasia in one building, but luxury can hardly be applied to gymnastic; for, setting aside its healthfulness, Aristotle expressly states that to its use the Spartans owed their supremacy in war, before it was adopted by the Athenians.

I must say a few words about M. Choisy, as we owe to him the elucidation of Roman vaulting. Before his great work was published, or the first outlines of it were mentioned by Viollet-le-Duc, the whole subject was in utter darkness, while now it is all light. Many years ago I was puzzled by the dome of the Temple of Jupiter in Diocletian's palace at Spalato. Adam shows the inside partially plastered, and it was doubtless once covered with mosaic; the brickwork of it consists of a series of arches superposed. Seeing that the Romans were a practical people, I asked myself why the cupola was thus built. The extra expense would be great, and if heavy centering was used why did they not run it with concrete; but when I understood that the object was to get light centering the reason was clear, though in this case it was to wholly avoid centering. M. Choisy, it is true, is an archæologist, and has caught some of the inspiration of Viollet-le-Duc; but he is also a scientific engineer, the Chief Engineer of Roads and Bridges in France, and he is practically engaged in large works. He may, therefore, be trusted, as his own scientific and practical reputation is at stake.

It is a mistake to suppose that the rubble of walls is concrete, in our sense; it is coursed, and my observation of this was confirmed by the Cavaliere Buongoanini; if it were thrown in as concrete the lie of the stones or brickbats would be in every direction. It is also a mistake to suppose that the arches are but skin-deep; each arch is divided into voussoirs by the two-foot brick; the skin-deep facing between them was to prevent

* *Stactè*, a kind of liquid myrrh [Pliny, *N.H.* xii. 35].

the mortar from squeezing out, and in each voussoir the rubble is laid in horizontal courses. It is true that when the vaults are completely set they possibly may have no more thrust than a china cup; but, considering the thickness of the vault and its backing, it would take many years to set thoroughly. That there was a thrust, or that it was expected, must be inferred from the buttresses to the vault of the Tepidarium of Caracalla's Thermæ, and those to the nave vaulting of the Basilica of Maxentius, not to speak of the careful way in which the thrusts of the halls at Caracalla's Thermæ are counterbalanced.

It is not to be credited that a network of burnt bricks which cost money to provide and fix should have been put in for nothing, and if the centering were strong enough to support the whole mass of rubble it would be useless. The most difficult problems to solve are the skin of flat tiles for large spans, and the brick ribs at great distances apart. Considering what a saving these Roman methods might effect, it seems extraordinary that neither Government nor the large Railway Companies have had experiments made to see if the facing of triangular bricks is sufficient to support the rubble without shoring until the bonders are put in, and to ascertain if two thicknesses of brick flat would support a rubble vault of eighty feet span on very light centering.—GEORGE AITCHISON.

* * The Discussion [see verbatim report in JOURNAL OF PROCEEDINGS, Vol. V., pp. 321-23] was restricted, owing to want of time, to two speakers—namely, Professors Aitchison and Kerr. A brief abstract of their remarks is here appended:—

PROFESSOR AITCHISON, A.R.A., *Vice-President*, believed that the whole of the civilisation of the Romans, and partly (through them) of what is called "modern life," came from the Greeks, without whom the world might have been devoid of eloquence, sculpture, painting, refined architecture, and music. Almost everything in the shape of art, science, and literature, enjoyed at the present day, the world owed to the Greeks. He had been immensely interested in what the author of the Paper had said about domed and vaulted structures, and he (Professor Aitchison) felt absolutely at one with him when he said that the Pantheon was not an invention of the day, as its prototype must have been in existence for several ages in some part of the world. The methods of Roman vaulting had all the appearance of having come from the East. Alexander the Great, who posed as a Greek, though he was not one, had undoubtedly a large number of Greeks in his army, and he, no doubt, introduced Greek civilisation into Asia and North Africa.

PROFESSOR KERR, *Fellow*, said that the Paper was an interesting exercise in the higher criticism. People were beginning to understand, with reference to the productions of ancient architecture, that under all changes of form, fashions of style, and mannerisms, there lay an element of structural necessity. The problem which the author of the Paper set before them was: What is the origin of that very remarkable development of the arch which has hitherto been considered the historical prerogative of the Romans? Now there was a system common in the East of constructing houses of mud, or rough stone, or anything that came handy, with mud domes or domical coverings, hundreds of which had disappeared hundreds of years ago—things built by rule of thumb, and no matter how, so that they stood. This system culminated, and it was difficult to say how, in the dome of the Pantheon. Another point, which ought to be raised at a future time, was the question of how the semicircular arch became converted, in the thirteenth century, into the sharp-pointed arch, which was also a structural question, and not one of artistic system at all.

LXII.

EXTRACTS FROM THE REPORT OF A TOUR IN
HAMPSHIRE, DORSETSHIRE, AND WEST SOMERSETSHIRE.By MR. ROLAND WILMOT PAUL, *Pugin Student*, 1888.

[Addressed to the Council.]

MR. PRESIDENT AND GENTLEMEN,—

I HAVE the honour to present to you my journal and sketches made during my tour as Pugin Student.* I chose Hampshire, Dorsetshire, and a portion of Somersetshire, as the district for my studies, and visited, amongst other places, Basingstoke, Winchester, Christchurch, Dorchester, Crewkerne, Taunton, and the portion of Somersetshire lying between Taunton and the Exmoor Forest. The first three places were particularly rich in late Gothic and early Renaissance detail, and in both the counties of Dorset and Somerset I found many traces of the same period of work, and also some interesting examples of domestic architecture.

S. Mary's, Old Basing.—Old Basing is rather under two miles eastward from Basingstoke. The church [Illustn. xx.], with the exception of the cathedral at Winchester, and the large priory churches of Romsey and Christchurch, is one of the largest in the country. Its plan may be compared with those of Rye and Winchelsea—a central tower, with aisles running the whole length of nave and chancel, making a simple rectangle, without any projections. There are marks of a south porch having existed against the outside of the aisle wall, and perhaps there was one to cover the Early English doorway on the north. The church is of Norman foundation, and traces of the church of that date still exist in the north and south arches of the tower. With the exception of this, and the doorway before-mentioned, the whole of the church is Perpendicular in style, and a very fine specimen of the period. The whole is built of flint and brick, mostly the latter; the central tower, except the pinnacle and dressings generally, is entirely of brick. The windows of the church are of stone, with the exception of those on the north side of the chancel, which have wooden tracery, an interesting example of the use of this material on a large scale. Both the exterior and interior are elaborately decorated with heraldic devices, being those of the Paulet family and their connections. There is a large niche with the Virgin and Child still left, supported by an angel holding a shield with Paulet quarterings. The drip terminations of all the windows east of the tower have shields of various shapes with arms, and other shields occupy the centre of each bay in the string over the windows. Altogether it is a very interesting example of the employment of heraldry in a general system of decoration, and this church in this respect should be studied with other places near—notably the church at Basingstoke, the Holy Ghost chapel, and the chapel of the “Vyne,” about five miles north. The interior of the nave is very

* See JOURNAL OF PROCEEDINGS, Vol. IV. page 120.

spacious. The arcade is of four bays, with large octagonal brick columns supporting four centred arches. All the roofs are old, and there are good corbels supporting the principals of the centre one. The interior gains much in dignity owing to the chancel being raised four steps above the nave, there being three more from the sanctuary to the altar. The chancel and its aisles may be described as being the chapel of the Paulet family. The walls separating the chancel on each side have been pierced with four canopied tombs, two on each side, with a door between them. They virtually form arcades, and the effect is very fine. The two on the north side alone bear inscriptions, and only one is dated. That nearest the altar has the following :—"HIC JACET JOHES PAULET ARMIG. ET ELENOR UX. EJ. "QUI OBIERUNT MENSE SEPTEMBRIS ANNO DNI 1488, I.H." The other one has the following unfinished inscription :—"HIC JACET JOHES PAULET MILES ET ALICIA UX. EJ. QUI OBIERUNT MENSE. . . ." Over the arch separating the north aisle of the nave from the chapel is an inscription which is difficult to make out, but it apparently refers to the restoration of the church by a Sir John Paulet in 1519. This may probably give the date of the above unfinished inscription. The tombs on the south side are evidently later in date. The same general design has been followed, but the detail is more Renaissance in character, particularly in the spandrels. Over these, too, runs an elaborate cresting [Illustn. xx.], which is interesting to compare with work of a somewhat similar nature done by Bishop Fox at Winchester on the choir-screen. His work is dated 1525. The cresting at Basing is better in design, and may probably be earlier. The whole of these tombs should be compared also with the Paulet tombs at Hinton S. George in Somerset [Illustn. xxii.]. Between the tombs, both facing the aisle and the chancel, are panels which contain the Paulet arms and supporters. They are very free in design, and derive additional interest from being in plaster, probably owing their freedom to this. With the exception of the crest, they are in good preservation. There are also smaller shields, with helm and mantlings over the crown of the arch of each of these tombs, also in plaster, but poorer in execution. The northern tombs have a canopied niche between them, obviously later in date, and poor in design. There is a good deal of funeral armour in the south aisle, and at the east end of the north aisle are some good tiles—one with the figure of a bishop under a canopy. The whole church measures rather over one hundred feet in length, and sixty feet in breadth.

Christchurch Priory, Hampshire.—The most interesting points in this fine church are the north porch, Early English, with a room over, a fine Norman nave, and Perpendicular west tower, a very gorgeous fourteenth-century reredos, with sculpture representing the Stem of Jesse, and the stalls and various chantries in the choir and lady-chapel. Of these chantries undoubtedly the finest is that erected to the memory of Margaret, Countess of Salisbury.* It stands on the north side of the sanctuary, immediately westward of the altar-screen, and is built of Caen stone. The chapel, approached on the level from the sanctuary, and up a flight of ten steps from the ambulatory, is of two bays, vaulted, with large bosses, and some rich niches are at the east and west end. The whole is a rich mass of delicate carving, some being quite Gothic in treatment (*e.g.* the carving at the east end below the niches), and others fully-developed Renaissance. The design of the front facing the ambulatory differs slightly in having a row of canopied niches below the open tracery, and there is also a space between the underside of the chapel and the floor, which is filled at present with some encaustic tiles. For the measurements of this chantry see elevations, plan, &c. [Illustn. xxi.]

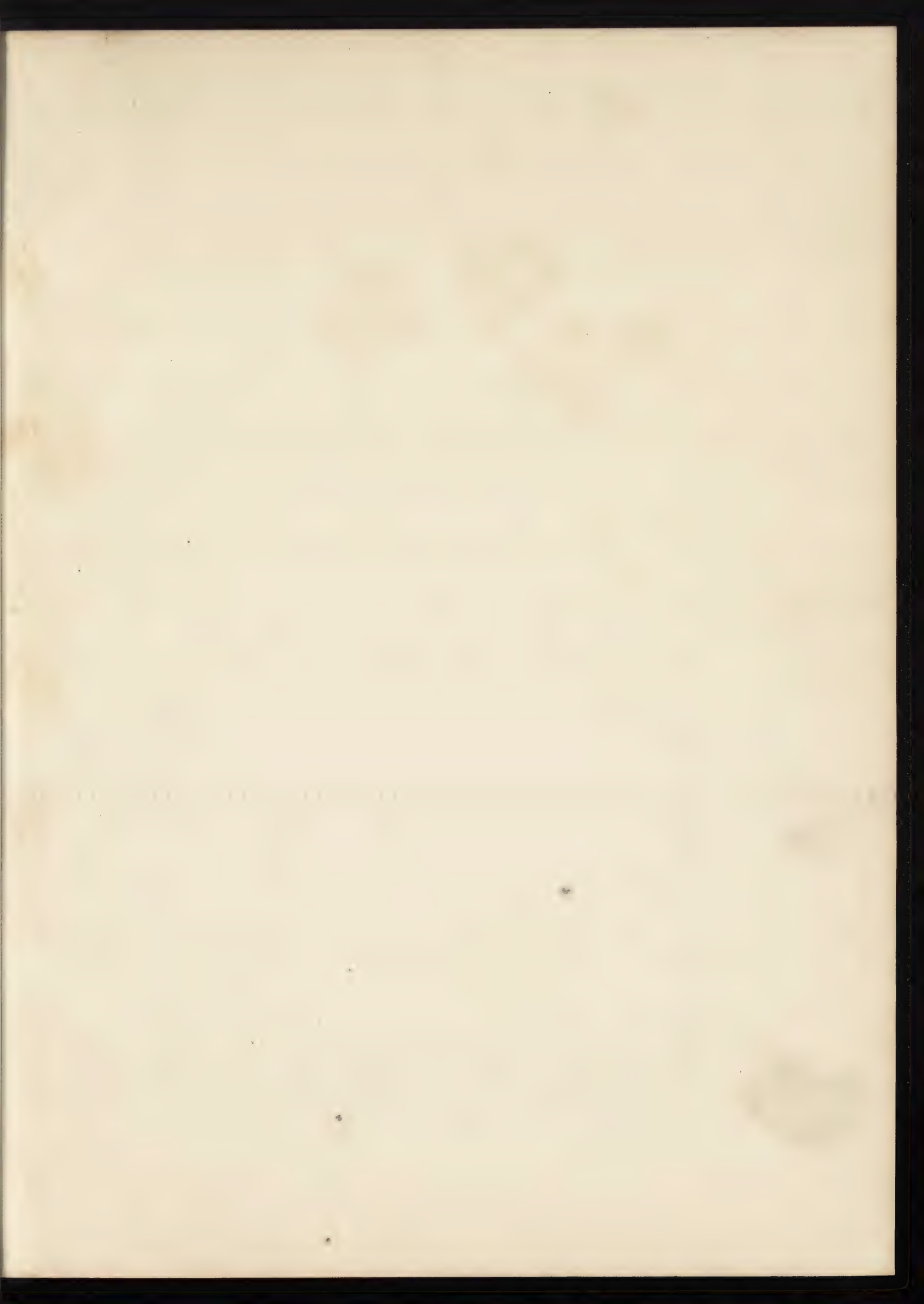
Hinton S. George, Somerset.—The church here is a good example of a small Perpendicular church, with a western tower of the Crewkerne type. It is chiefly remarkable for its monuments. In the nave on the north side is the monument of Sir John Dennband, died 1511—an altar tomb with a recumbent effigy in armour. The backs of the niches round the sides in one or two cases retain some decoration, chiefly green leaves on a red ground. One panel has a shield, another a kneeling figure. On the north side of the chancel is the Paulet chapel with some very gorgeous tombs [Illustn. xxii.]. On the north side under the windows are two canopied tombs of curious design to Hugo Paulet and his wife, and Amicius Paulet and his wife (dated 1537). The tombs have four centred arches with richly

* A view of the interior of this chantry—the Countess of Salisbury's Chapel—is given in Ferrey and Brayley's *Antiquities of the Priory of Christ Church, Hants.* (Lond. 1834), engraved from a drawing by the late Benjamin Ferrey, *Past Vice-President.*

ornamented backs, soffits, and arch-mouldings, the spandrels bearing the Paulet arms on shields, and the whole being surmounted by a rich cresting. Between and at each end of the tombs are carved balusters. There are four recumbent effigies, and kneeling mourners by the side of them. Against the east wall is a huge monument of plaster, painted to imitate marble, to Lord George Paulet, and against the west wall is a monument to Sir Amos Paulet, removed from the church of S. Martin-in-the-Fields, London, on the rebuilding of that church. Between the chapel and the chancel is a canopied Renaissance tomb dated 1600. The font is apparently a Norman one reworked in Perpendicular times.

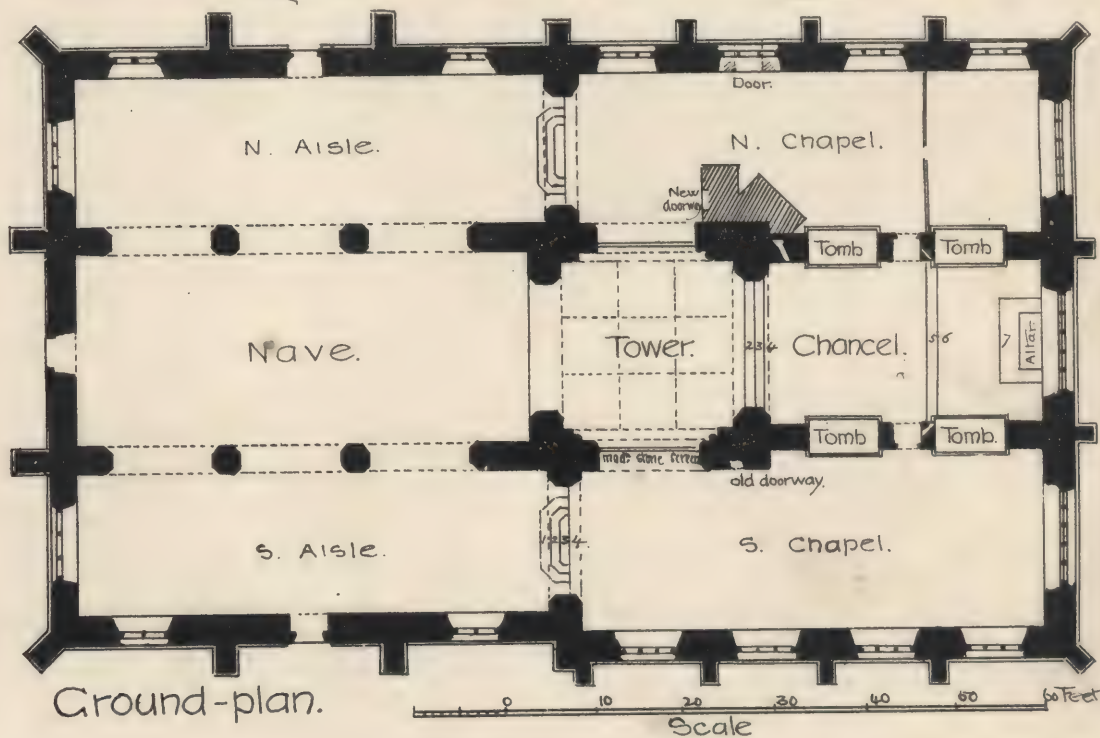
During my stay at Winchester I visited S. Cross, Stoke Charity, and Headbourne Worthy. On leaving Christchurch I went to Wareham, Bere Regis, Swanage and Corfe Castle, Dorchester and its neighbourhood, and Beaminster. From Hinton I went to Chard, whence I visited Ford Abbey, Winsham, Wayford, Coombe S. Nicholas, and Whitestaunton. After Chard I went through to Taunton, and thence to Cleeve Abbey and Old Cleeve, and the various buildings of architectural interest in the neighbourhood. My tour occupied more than the eight weeks required under the conditions of the Studentship, as I left London early in July, and returned in September, 1888.

ROLAND WILMOT PAUL.



St Mary's Church
Old Basing, Hants.

South west view



View of Interior of Chancel from Sth Chapel.



Molding at B.

Scale of Inches for Moldings.

Moldings of Jamb. & Arch.

Tracery.



Sketch of Cresting.

Upper Slab of Tomb at A.



Roland to Paul
 Nov 21 1889.

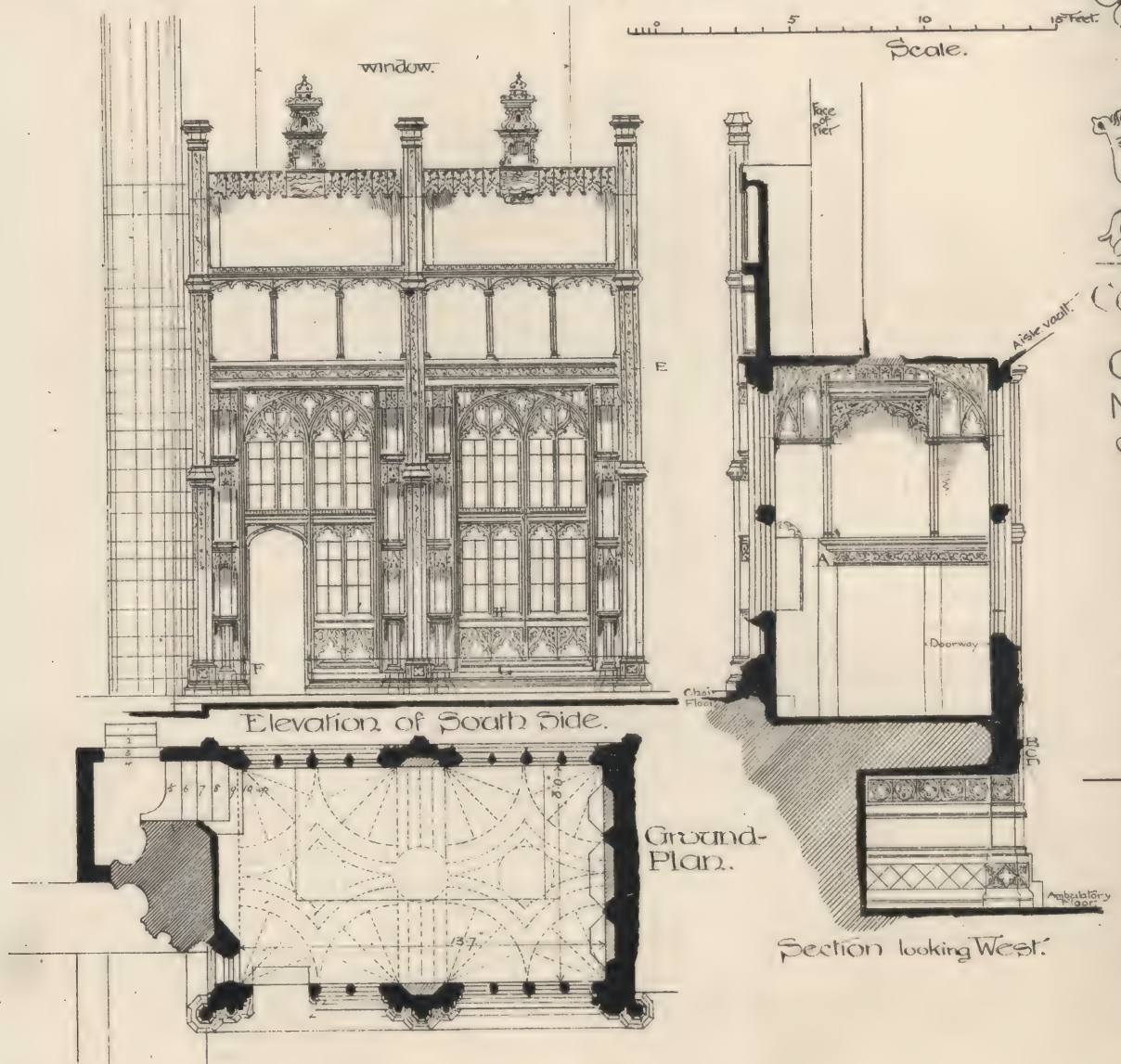
with Arms (in plaster) on S. side.

See Page 162.





Christchurch Priory, Hampshire. Chantry Chapel of Margaret, Countess of Salisbury.



1 Foot
2 Feet.

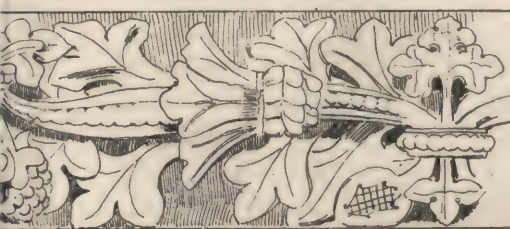
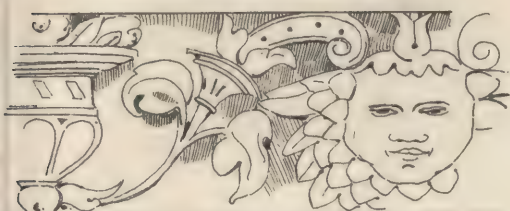
Scale for Carving: except where figured.
Scale for Mouldings



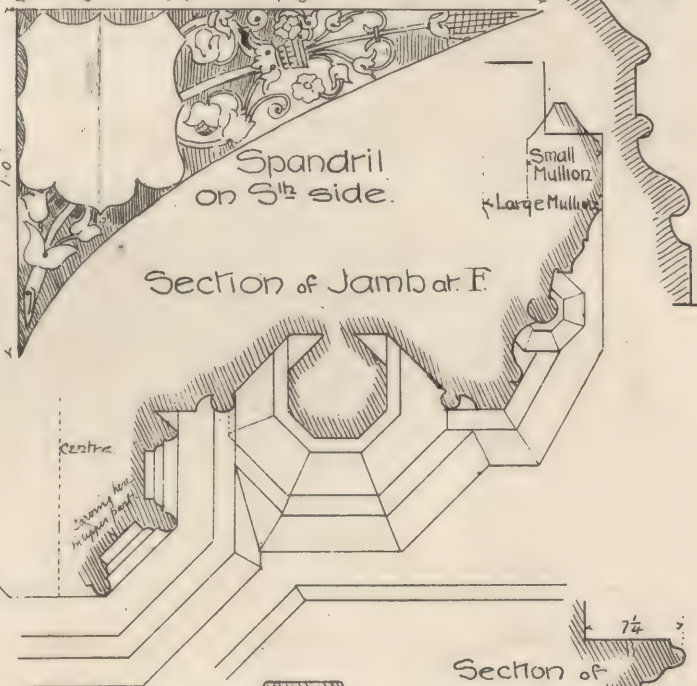
Carving
at E



Details.

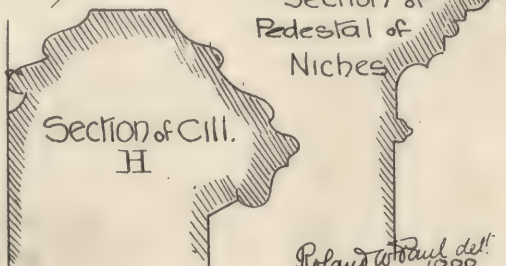


Carving on
Sth side of
Staircase



Section of
Plinth
at G

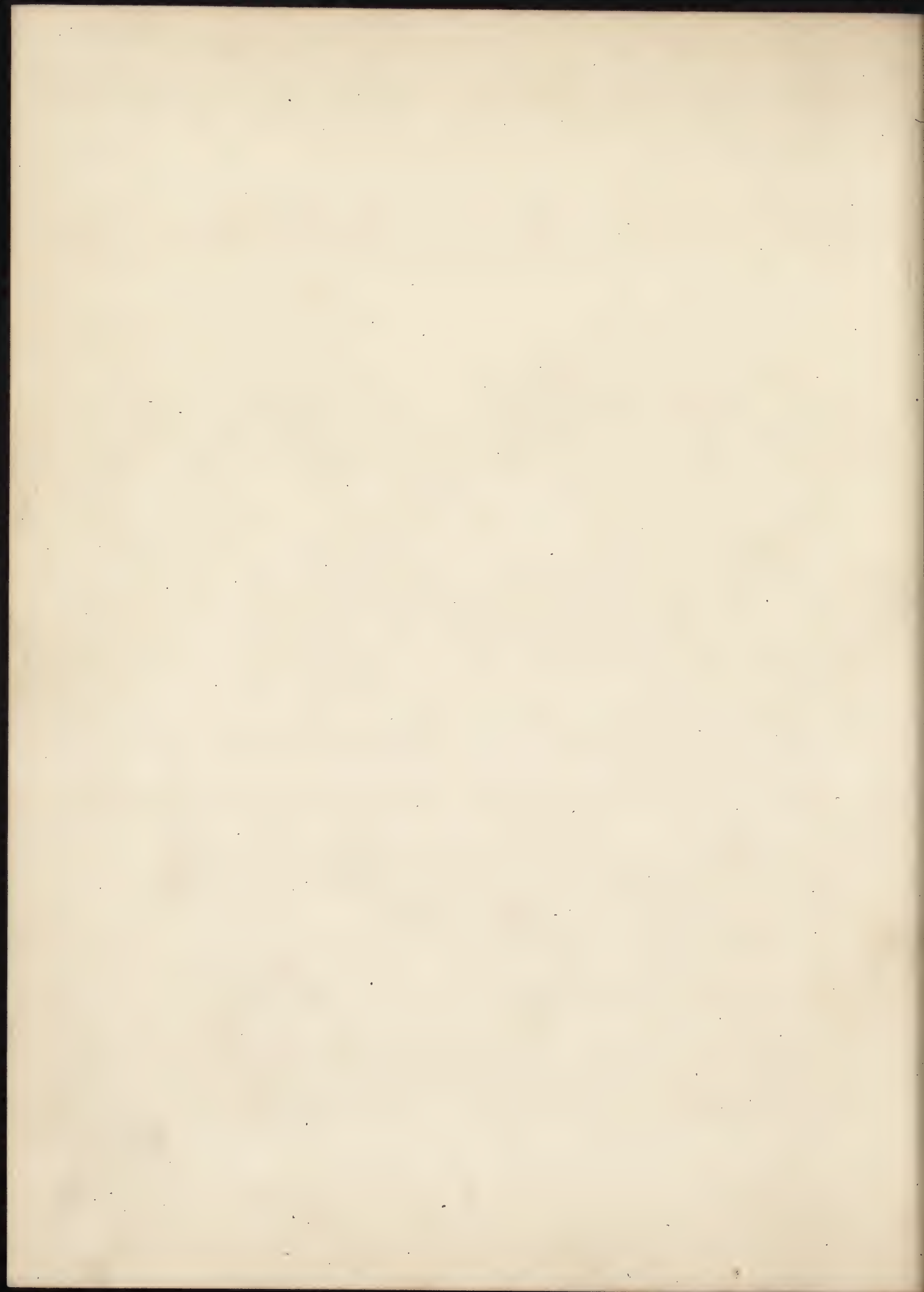
Section of Jamb at F

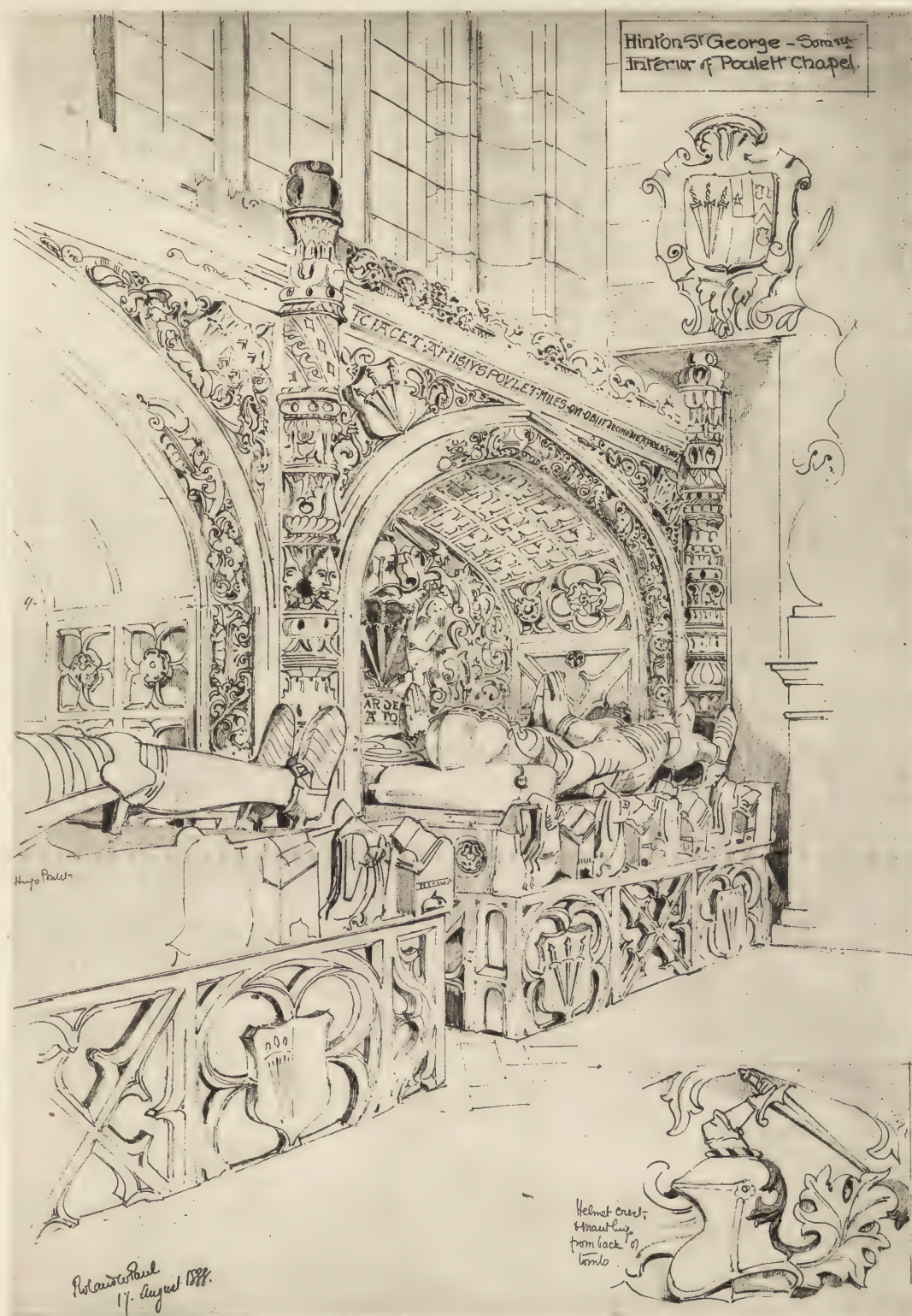


Section of
Pedestal of
Niches

Section of Cill.
H

Poland & Paul del.
1888







LXIII.

FIVE FAMOUS DOMES: THEIR HISTORY AND CONSTRUCTION.

A PRIZE ESSAY, SESSION 1888-89.*

By Mr. PERCY SCOTT WORTHINGTON, B.A. Oxon., *Institute Silver Medallist.*

[Addressed to the Council.]

MR. PRESIDENT AND GENTLEMEN,—

IN compiling this Essay, the history of the two churches of classical times has been gathered from various works. As regards the Pantheon, there are allusions to it in Suetonius, Pliny, Cicero, and others; but Dion Cassius is the chief authority, writing as he did only a short time after the death of Hadrian; and the state of the Pantheon during the time of the Popes has been gathered principally from Ranke. Of the building of S. Sophia, Procopius, among the historians of the Eastern Empire, gives the most circumstantial and trustworthy account; though the later Greek historians are more curious. The construction of the two Domes has been described, chiefly on the authority of M. Auguste Choisy, in his books *L'Art de Bâtir chez les Romains* and *L'Art de Bâtir chez les Byzantins*;† and further, for the Pantheon, Isabelle and Viollet-le-Duc; and for S. Sophia, Salzenberg and Fossati. The history of S. Maria-del-Fiore is to be gleaned from the lives of its architects given by Vasari and Quatremère de Quincy; its construction from Isabelle and Durm, who also give particulars of its history. The building of S. Peter's may be followed historically in Vasari and Quatremère de Quincy, Ranke's *History of the Popes*, and Fontana's *Templum Vaticanum*; Durm again gives the most recent research, both as regards history and construction. What there is of historical interest connected with the present cathedral of S. Paul is contained in the *Parentalia*; but there are few published accounts of its construction—none entering into any great detail—and my description has been consequently given from examination of the building and from drawings.

The Pantheon, Rome.

HISTORY.—The history of the Pantheon is involved in much obscurity, entails much labour to collect, and is unsatisfactory and scrappy when collected. But what can be learnt from various sources is here put down, and an attempt made to arrive at a decision as to its date. Whatever the real date of the building, it has, at the lowest computation, resisted the all-devouring hand of time, the attacks of human vandalism and religious fanaticism, for more than 1,700 years. Like a few other buildings of classical times, it was adapted, in due course, to the religion which replaced

* See JOURNAL OF PROCEEDINGS, Vol. V., pp. 111, 115, and 132.

† Two copies of these valuable works are in the Institute Library (Reference and Loan), and a notice of them by Professor Aitchison, A.R.A., *Vice-President*, appeared in the JOURNAL OF PROCEEDINGS [Vol. V. N.S., p. 305], on the 6th June 1889.

that for which it was originally intended. As the Mussulman converted the Christian temple of Justinian into a mosque, with none but decorative alterations, so the Christian of the Western Empire broke the images of the gods, and installed his own worship in the pagan temple. Hence the building has had more or less uninterrupted care from the time of its erection; and, as has been remarked, it is not possible in such a series as the Pantheon, the Temple of Minerva Medica, and S. Vitale, to point out what part really belongs to Pagan and what to Christian art.

As to the original purpose of the building, there is much difference of opinion. By some it is supposed that the Pantheon was the Laconicum of the Baths of Agrippa, which stood behind it. But the building, or its predecessor, may have been built by Agrippa as a temple to Jupiter Ultor, in honour of Augustus's victory over Anthony and Cleopatra, obtaining the name "Pantheum" from the fact that all the great gods found a place in the temple. The reasons for concluding that the present Pantheon was a separate building are many. Any entrance to the Thermæ can only have been where the great niche now stands, opposite the entrance; but this is said to be constructed of the same bricks as the rest of the building, and therefore must have been part of the original structure. Traces also of the external marble casing have been found on the outside, where the baths were built up to the Rotunda at a later date, and the lines of the cornices can be distinctly followed all round the building. Thirdly, it is expressly mentioned by Dion Cassius that the two buildings were being built at the same time, and that the temple was finished two years sooner than the baths. Moreover, besides direct allusions to the progress of the Pantheon and the Thermæ, Dion Cassius gives a list of the structures injured by the fire in 833 A.U.C. or 79 A.D. [Dion Cass. lxi. 2], in which they are separately mentioned as having suffered; when, besides the Pantheum and the Thermæ of Agrippa,* seven temples of Neptune, the Temple of Capitoline Jove, and many other buildings, were burnt.

Without discussing at present whether there has been more than one building erected on the site of the Pantheon, a few facts and dates will be interesting. A domed building, called the Pantheon,† was finished by Agrippa in 27 B.C., and the internal decorations were completed in 25 B.C. The date of completion is fixed by the first inscription on the portico:—

M. AGRIPPA. L.F. COS. TERTIVM. FECIT.

Two years later the building was struck by lightning, but little damage was done [Dion Cass. lib. 1]. Two inscriptions below this record successive restorations: one upon the lower part of the architrave:—

IMP. CAES. M. AVRELIVS. ANTONINVS. PIVS. FELIX. AVG. TRIB. POTES. V. COS.
PROCOS. PANTHEVM. VETVSTATE. CORRVTVM. CVM. OMNI. CVLTV. RESTITVERVNT.

The other, given here in chronological order, is as follows:—

IMP. CAES. L. SEPTIMIVS. SEVERVS. PIVS. PERTINAX. ARABICVS. ADIABENICVS.
PARTHICVS. MAXIMVS. PONT. MAX. TRIB. POT. X. IMP. XI. COSS. III. P. P. PROCOS.

The Emperor Phocas repaired the vault in 604, after which nothing is known of repairs until the year 608 A.D., when Boniface IV. dedicated the old pagan temple to the Virgin and holy martyrs. How it had fared at the time of the Gothic invasion and through the years that preceded its re-dedication we do not know, but it does not then seem to have been in any very dilapidated condition.

During the seventeenth century several of the Popes repaired the dome. The work of Urban VIII. is recorded in the inscription on one side of the entrance as follows:—"Pantheum ædificium toto terrarum orbe celeberrimum ab Agrippa Augusti genero impie Jovi cæterisque mendacibus diis consecratum a Bonifacio IV. pontifice Deiparæ et sanctis Christi martyribus pie dicatum, pont: max:

* Pliny, who was born some eleven years after Agrippa's death, and who describes the finishings of his Thermæ, refers also to the internal fittings of the Pantheum; but no one of the ancient contemporary writers has in any way described the shape of the latter building.

† τό τε Πανθεῖον ὠνομασμένον ἐξετέλεσε [Agrippa]. προσαγορεύεται δ' οὕτω τάχα μὲν ὅτι πολλῶν θεῶν εἰκόνας ἐν τοῖς ἀγάλμασι τῷ τε τοῦ Ἀρεως καὶ τῷ τῆς Ἀφροδίτης ἔλαβεν, ὥς δ' ἐγὼ νομίζω ὅτι θολοειδὲς ὃν τῷ οὐράνῳ προσέοικεν ἡβουλήθη μὲν οὖν ὁ Ἀγρίππας καὶ τὸν Αὐγουστον ἐνταῦθα ἰδρύσασθαι τὴν τε τοῦ ἔργου ἐπικλήσιν αὐτῷ δοῦναι· μὴ δεξαμένον δ' αὐτοῦ μηδέτερον ἐκεῖ μὲν τοῦ προτέρου Καίσαρος, ἐν δὲ τῷ προνόμῳ τοῦ τ' Αὐγούστου καὶ ἑαυτοῦ ἀνδριάντας ἔστησε.—Dion Cass. liii. 27.—P. S. W.

"binis ad campani æris usum turribus* exornavit et bona contignatione munivit. Ann: dom: 1632, Pontif. IX." On the other side of the door are these words:—"Urbanus VIII. Pont: max: vetustas ahænei lacunaris reliquias in Vaticanas columnas et bellica tormenta conflavit ut decora inutilia et ipsi prope famæ ignota fierent in Vaticano templo apostolici sepulchri ornamenta in Hadriana arce instrumenta publicæ securitatis.† An: dom: 1632, Pont. IX." Thus in these operations the whole of the brazen covering to the dome, with the exception of the rim round the edge of the eye, disappeared.

After Urban, Clement XI. [1700-14] and Benedict XIV. [1740-58] repaired the dome. This is the last time that the building was materially touched, and, with the exception of its internal decorations and external facing, it remains at the present day in its original state.

It is *almost* certain that the date of the Rotunda is later than that of the Portico; it *is* certain that it is not older. Those who hold that the two were built at the same time point to the alleged fact that identically the same kind of bricks are found in the Portico, and that there are no signs of the one being added on to the other. Dion Cassius evidently was of opinion that Agrippa built the dome; but it was not built before the death of Vitruvius, or otherwise he would surely have mentioned a piece of construction so wonderful for the age, and apparently so novel.

That the Portico dates from the age of Augustus there can be no doubt, both from the style and its inscription; and it is probable, from the arrangement of the columns, that it formed the pronaos to a three-celled Etruscan temple, with a wooden roof.‡ The building was several times injured by fire, probably in the great conflagration in Nero's time, and certainly later, in A.D. 79, with regard to which occurrence the language of Dion Cassius leads to the supposition that it was entirely destroyed. While a three-celled temple would be in perfect harmony with the age of Augustus, and would be likely to be seriously injured by fire, the present Rotunda has many evidences of belonging to an age of decadence in art, though of constructive ingenuity, and against it fire could have no effect.

Evidences of a later date than the time of Agrippa are the addition of the round to the square form of the Portico; the carrying up of the niches behind the entablature of the lower internal Order; the use of triangular facing bricks, whose place in the Augustan age would have been taken by *Opus reticulatum*; the construction of discharging arches in the walls and roof; and the use of porphyry and Oriental marbles in the decoration of the interior. But it seems to me that, in assigning the building to the reign of Hadrian, authorities are probably mistaken, and almost certainly so in wishing to father it upon a still later age. Dion Cassius was born in the year 155, went to Rome in 180, and in 222 finished his history, to compile which he had taken more than twenty years. Hadrian reigned from 117 to 138, and then died, only seventeen years before the birth of Dion. That historian believed that Agrippa built the dome. "He completed the building called the Pantheon, so named . . . because, as I think, it 'was domical (*θολοειδὲς*) and like the sky'" [see p. 166, note], and it could hardly be that in forty years all clue should have been lost to the erection of so important a temple. Besides this, Dion Cassius relates that, in the first year of his reign [Dion Cass. lxi. 7] Hadrian used to give judgment in the Pantheon often in preference to his own palace or the Forum, and such restorations as he may have carried out there (and it is known that he did some) were probably to fit it for such imperial ceremonies; but Hadrian could not have erected it in so short a space of time as that implied. Thus I should place the date of the building some time after the fire of A.D. 79, and before the accession of Hadrian in A.D. 117, and probably in the first half of that period.

CONSTRUCTION.—The dome is a semicircle, whose centre is almost precisely on the springing line,

* Built over the staircases in front of the dome.—P. S. W.

† They were used for cannon and the Baldachin of S. Peter's.—P. S. W.

‡ See Fergusson's *History of Architecture*, London, 1865, vol. i., p. 285. Referring to the Portico, he says:—"The pillars are disposed in the Etruscan fashion, and it is probable that they originally formed the portico to a three-celled temple. . . . I feel convinced that . . . the rotunda is very much more modern than the portico. We know from history that the building was frequently damaged by fire, that it was first restored by Hadrian, and afterwards, according to an inscription still existing on its portico, that it was repaired, if not rebuilt, by Marcus Aurelius and Septimius Severus. The inscription expressly says it was restored because it was ruined from age (*vetustate corruptum*). A building that shows no sign of decay after seventeen centuries of neglect and spoliation could hardly have fallen to decay in less than two hundred years of honoured occupation. It is therefore natural to conclude that the present building is not that alluded to, and that the original cella was of the usual square Etruscan form."

and the height from the pavement to the eye is very nearly the same as the diameter of the Rotunda—43·754 mètres.

The plan [Illustrn. xxii.] is circular; the whole building is vaulted, and lighted by a circular eye at the summit of the dome. By this, the huge space within is perfectly lighted, in spite of there being no other openings through which light can gain admittance. The wall is immensely thick, but hollowed to a great extent by niches and cavities, so as both to economise material and lighten the structure, while the dome is supported by no abutment external to the building; for though its stability is entirely dependent upon its abutment, this is all obtained above its springing and within the circle of the Rotunda.

The wall of the building stands upon a podium or stylobate of Travertine stone, which was faced with marble. Leaving the Portico, as external to the construction of the dome, the buttresses which adjoin it are the first features that arrest attention. They are added on to the Rotunda, and are of construction similar to the rest, with the staircases inside them approached by doors in the outer sides, and formed with pilasters corresponding to the pillars of the portico and semicircular recesses between them. In the centre is the entrance doorway, and above the staircases were the two turrets, now removed, added by Urban VIII. [Illustrn. xxiv.]

The thickness of the Rotunda wall is six mètres, but at very few points in the building is this thickness of solid construction. As the ground-plan shows, there are eight openings, whereof one forms the entrance, with the great niche of semicircular form opposite, and on either side are three smaller openings, of which the two central are semicircular, the others of rectangular form, and all are surmounted by a running entablature (except the great niche), with two detached columns to carry it across each opening. These niches, or tribunes, form, with the entrance doorway, eight arches, upon which, with the piers between, the dome is built.

The interior elevation is deceptive, as the niches, instead of being roofed at the level of the cornice of the lower orders, as might be expected, are carried up behind the upper Order, which forms the attic, and arched just below the level of the great cornice. The entablature of the large Order, which carries the attic wall, of about one metre in thickness, to hide the upper part of each niche, is relieved over each opening by three double arches, springing from points over the columns. The semicircular arches which roof the niches are carried through to each face of the wall, showing on the exterior in courses of bricks two feet in depth. They are composed, for the two lower quarters of the half circle, of bricks, bonded together; while the crown of the arch is in three unbonded courses, one above the other. There are, again, cross-arches from either wall, supporting the large arch, whose soffit is of square tiles laid first on the centering in two courses, with the construction just described above them. The piers between the niches are not solid, but have in their height two tiers of semicircular cavities vaulted over to the inner wall, one above the other.

This brings us to the dome itself, which springs above the main cornice, and whose construction will first be discussed; and afterwards the means by which abutment is obtained, by building heavy masses upon its haunches, will be described. With the exception of one of the Piranesi, no architect who has had anything to do with the dome has left a hint as to how it was constructed: and therefore, as his is the only authentic information extant, we are bound to receive it, however sceptical we may be.

Other examples, existing in a less complete form, afford some knowledge of how the Romans constructed their vaults; and though they may not be of the same date, a slight description of them may assist in any attempt to understand the methods employed at the Pantheon.

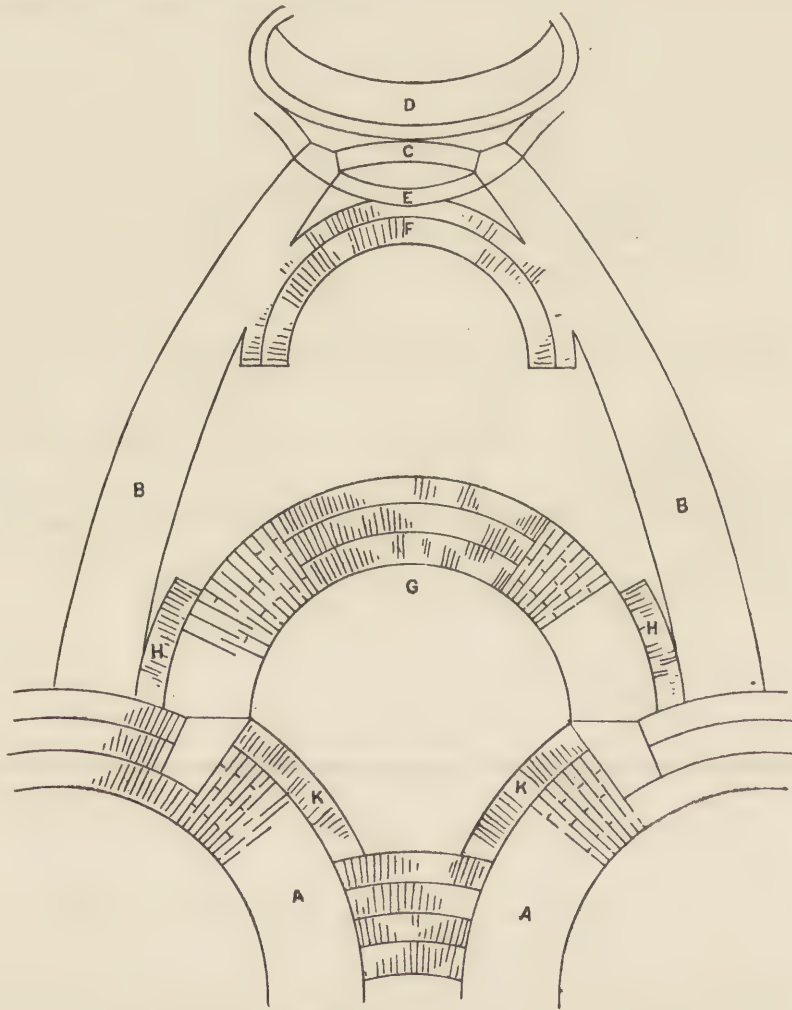
The half dome, or apse, of the Temple of Peace dates from the beginning of the fourth century, and consists of octagonal coffers formed between vertical and horizontal ribs, the diamond-shaped intersection of each four ribs containing a small coffer. The vertical ribs are of bricks, on bed, as also the octagons between the coffers; but the horizontal bands are of concrete, for which bricks projecting from the intersection form the key. The rest of the dome is of concrete, with horizontal bands of brick. The whole of the dome was built up regularly together upon a centering, after the ribs had first been constructed; while bonding courses of brick were carried through the concrete filling, to bind it together and to the ribs.

The building known as *Minerva Medica* was very similar in appearance to the Pantheon, but much smaller in size. It had no coffering in its vault, and was built on a decagonal substructure. Springing

from the junction of ten arches in the walls are ribs of brickwork meeting in the centre, two bricks wider for one-third of their height than above that point. Abutment, on the outside, is obtained in exactly the same way as in the Pantheon, and the space between the ribs is filled in with concrete tied together with seven courses of bricks.

The tomb of the Tossia family is again, as regards its vault, a miniature Pantheon, but with abutment solid instead of hollowed with cavities, as in the larger example. Nor do the ribs start at the springing of the dome, but about half way up it, the whole of the lower half being of concrete, constructed on a centering, and forming a substructure upon which the ribs rest.

Such are the closest analogies to the Pantheon, and form data, together with what other information is available, upon which to construct its ribs.



PIRANESI'S SKETCH OF THE ACTUAL CONSTRUCTION AS SEEN BY HIM.*

[From *Raccolta de' Tempj antichi*, Vol. VI. Part II., Tav. xxiv.]

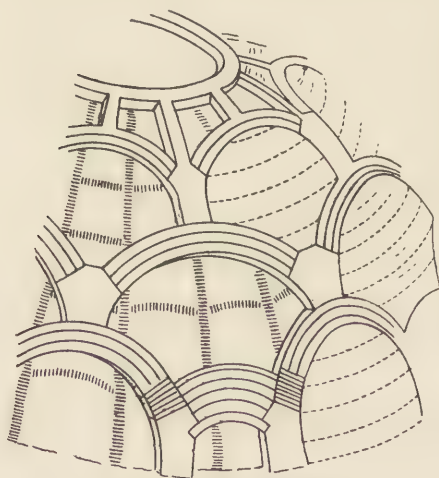
With regard to the various theories held as to the construction of the Pantheon itself, there is but one man who has any claim to speak as having authority in the matter. He left behind him

* See *L'Art de Bâtir chez les Romains*, Paris, 1873, p. 85. M. Choisy's words are :—"Piranesi a trouvé, " lors des réparations faites à la voûte sous le pontificat de Benoît XIV., une occasion d'en étudier les détails. " Les enduits, en partie usés par le temps, durant être arrachés sur plusieurs points et refaits à neuf : on

elaborate sketches of the construction of the dome, and has been followed by eminent writers, who, however, differ in detail. This man was (Giambattista?) Piranesi, architect to the edifice, whose sketches were published by Francesco Piranesi, and who carried out restorations of the Pantheon in the year 1743 under Benedict XIV.

Isabelle has no hesitation in denouncing the theory evolved from Piranesi's discovery as entirely erroneous, and instead of ascribing to the dome an outer covering formed by a series of arches, as do Viollet-le-Duc and M. Choisy, he maintains that the dome was built as simply as any of the three before described. Isabelle states his opinion that upon the large cornice a centering was built, consisting of huge trussed ribs, whose upper ends were fixed in a circular rim corresponding to the future eye. Of these there were twenty-eight. Between them five horizontal ribs were fixed, forming spaces for four rows of coffers all round the dome, above the highest of which started the plain soffit, between the coffers and the eye. The ribs were formed with rebates, thus allowing the centering for the coffers to rest on them. Upon this centering the ribs of the dome were constructed, both vertical and horizontal (the latter being slightly arched); and when they were completely finished and settled, the moulds for the coffers were placed in position, and the whole of the spaces filled in with concrete from bottom to top of the vault, and finished flush with the outer face of the ribs. Thus a light and strong vault was formed—indeed, if one may judge from the examples before described, strong enough to stand without the system of arches given by Piranesi. So thinks Isabelle, and, so far, all authorities agree. But Isabelle mentions this as being the whole construction of the dome, and draws his section showing the ribs of the same thickness as their depth, with an outer coating of mortar to cover the whole.

With this Viollet-le-Duc and M. Choisy disagree. The former has described the construction of Roman domes, and his description, though it cannot apply to the Pantheon, was based, doubtless, upon



VIOLLET-LE-DUC'S SCHEME.

what Piranesi had left, and the information obtained from M. Choisy. According to Viollet-le-Duc, when the ribs had been built up, and the filling-in completed, three tiers of arches were built upon this, following the curve of the dome. To strengthen the lowest tier, and prevent too large a radius, small but deep arches were placed between them, and the two upper tiers sprang from the crown of the arch below. The top arches were raised on a rib which ran through above them to the circle of brickwork, forming the eye; and a small rib above each of these highest arches connected its crown with the circle of the eye. The spaces were all filled in with concrete, and bonded by courses of brick.

But M. Choisy gives a copy of the drawing published by Piranesi [see preceding page], and, describing it, states that from the crowns of the lowest arches, A, spring ribs, B, gradually diminishing in width until they terminate short of the eye, and carry flat arches, C, that support the circular rim of the eye, D. Starting from the top of the

ribs are also flat inverted arches, E, which strut the ribs and distribute part of the strain to an arch, F, shown as if supported by nothing. This curiously detached arch shows that the arches, ribs, and filling-in of this outer casing were all carried up together, as otherwise there would have been nothing

"établit alors un échafaudage mobile, roulant sur la saillie de la corniche et pivotant autour d'un axe situé au sommet du dôme; et Piranesi, qui s'était proposé de sauver par ses dessins les vestiges de l'ancienne Rome, profita de cet ingénieux appareil pour observer les moindres détails de la coupole, dont il pouvait parcourir la surface intérieure tout entière.

"Les conjectures hasardées entrent pour une part regrettable dans les travaux de Piranesi; ici toutefois son témoignage mérite une certaine confiance: les circonstances où il se trouvait placé semblent être pour nous une garantie: et le soin même qu'il a mis à rendre les parties de l'édifice encore visibles répond dans une certaine mesure des faits que nous ne pouvons vérifier aujourd'hui." M. Choisy adds, in a footnote:—"Piranesi fait valoir lui-même cette preuve en faveur de son témoignage: le dessin qu'il donne de l'intérieur de la coupole la représente, dit-il, '*come si vidde quando fu spogliata dell' antica intonacatura.*'"

for it to rest on. Viollet-le-Duc's second tier of arches is there, G; but they spring between the ribs from stone seatings in the lower arches, with extra courses of brickwork, H H, to pack them up.

The two schemes are identical in principle; but Isabelle, ignoring Piranesi's discovery altogether, relies upon the following arguments. First, in the other domes referred to nothing of the kind is found. Secondly, the depth of the coffers would not allow enough space between them and the outer face of the vault in which to construct such arches. Thirdly, it would be extremely difficult to build the arches to the curve of the dome.

On the other hand, it may be contended that the other vaults are no guide. Though the Temple of Peace [306 A.D.] is held by some to have been of not much later date than the Pantheon, the vault of Minerva Medica is much later, and also that of the Tossia tomb. Taking the depth of the coffers of the Pantheon dome at Isabelle's own valuation, there *is* room for an arch, with space for concrete as well; while, with such an immense curve as that of the dome, with the inner casing to build upon, and with Roman mortar and wide joints, no difficulty would be experienced in constructing such a system of arches. But, besides such arguments, this form of construction is in entire harmony with the rest of the building, which consists of arch after arch in the thickness of the walls, though they may, from a constructional point of view, be quite unnecessary.

As to the stability of the dome there is no doubt, seeing the length of time that it has stood—nor has it, so far as we know, ever shown signs of failing. Perhaps the most curious and characteristic feature of the building is that part which, rising above the lower part of the dome, forms its abutment. The external face of the Rotunda is carried straight up until stopped by the third cornice. Above this is a wide weathered flat, from which the abutment rises in steps, which merge in the dome at about three-fourths of its height above the springing, forming a solid mass of concrete at the foot of the dome, tied together by courses of bricks, stopping against the exterior of the vault itself.* Round the base of this mass are cavities, roofed by semicircular arches, showing on the outer face of the wall, and of similar construction to those of the niches and cavities below. These are alternately larger and smaller: the former rectangular and divided into three divisions by cross buttresses; the latter semicircular, with one buttress dividing them into two divisions. These buttresses contain discharging arches from one wall to the other, and practically act as flying-buttresses against a Gothic vault, to resist the lateral thrust of the dome.

S. Sophia, Constantinople.

HISTORY.—The present church or mosque of S. Sophia stands upon the site of the old church of the Apostles, built by Constantine in the year 328 A.D. That building had suffered several times from fire—notably in the riot which accompanied the banishment of S. John Chrysostom, and in that which took place between the “red” and “green” in 532, when Justinian sat upon the throne of the East. Procopius quaintly remarks that “God allowed the rioters to commit the crime (of burning the church), since He had knowledge of how great would be the beauty of the church when restored”—and, indeed, tradition carries this idea still further, and says that an angel appearing three times to Justinian gave him successively plans, name, and money for the church, which was therefore called *Ἁγία Σοφία*, or Holy Wisdom. Tradition also says that bricks of extraordinary lightness were manufactured and brought from Rhodes, with which to construct the dome [Procopius, *De Æd. Jus.*—Codinus *Descr. S. Sophiæ*], and that each brick was stamped with the motto, “God has laid the foundation; He will provide.” None of these have, however, been found. The later Byzantine historians relate marvellous tales of the materials used. Codinus, if I remember rightly, asserts that the dome was *κισσάρινος*—constructed of ivy wood. But, fearful that fire might destroy this new building, as it had frequently done the church of Constantine, no wood at all was inserted in the fabric—brick, stone, marbles, and iron alone being the materials employed.

In the fifth year of Justinian—532—the church was begun, the foundations being most carefully laid to the depth of twenty feet and covered with asphalt. Ten thousand workmen and one hundred master-masons [Gibbon, *Decline and Fall*, &c.] carried the work on, under the superintendence of the

* This serves the same purpose as weight upon the haunches of an arch, and increases the thickness of the solid vault to such an extent that a straight line can be drawn within its section from the foot of the abutment to the eye.—P. S. W.

architects Anthemius of Tralles, and Isidore of Miletus; while the Emperor ransacked the most beautiful churches of Asia Minor and Greece in order to obtain materials for his own.


The building proceeded with great despatch and success, with the exception of two accidents, graphically described by Procopius. The eastern arch had been built up on each side, but the crown was not yet completed, when the piers beneath, yielding under the weight, began to split in all directions. Anthemius and Isidore, frightened out of their wits, hurried to the Emperor, and told him what had happened. He, "from some strange impulse, and probably inspired by heaven, since "he was no architect, ordered them to complete the arch. For, he said, it would by resting upon "itself relieve the piers below." His bidding was done, and the operation successful. He goes on to relate how the north and south arches * next pressed too heavily on the piers, whose faces were cracking off under the load imposed on them. Justinian's ready wit (or inspiration) at once suggested a way out of the difficulty. The arch was propped up, and the top of the piers removed, and left thus to settle until all the "dampness" had gone out of the pillars. What became of the two adjoining arches, meantime, which sprang equally from the same piers? There is no mention of their being treated in a similar way, though they must have been also affected.

According to some accounts the church was finished in seven years; but, in all probability, the date of its completion was 548, or sixteen years after its commencement. Some ten years after its dedication [558] there was a terrible earthquake. The extraordinary flatness of the dome, which, added to the fact that it seemed to spring from so slight a support, gave rise to descriptions existing of it as seemingly suspended from heaven, was at the same time a source of danger. The limit of daring had been surpassed, and the shock brought down the cupola in a mass of *débris*. However, Justinian commissioned the nephew of Isidore to restore it, which he did speedily and effectually. The dome was raised twenty-five† feet, and its diameter contracted. The large buttresses, which had been before stopped under the roof of the side galleries, were carried up to their present height, and abutment given to the cupola by building above those parts of the north and south arches which had before presented a bare extrados outside the platform of the dome.

Since this restoration the dome has stood to the present day, with some slight failures, often attributable to neglect; and consequently restorations, chiefly to the arches and eastern semi-dome, have had to be undertaken. Thirteen hundred years have elapsed since its completion, and it still astonishes by its construction, unmoved by the earthquakes which have so frequently visited Constantinople.

Basil the Macedonian [867-86] repaired the eastern arch, and perhaps the eastern semi-dome; and at the beginning of the tenth century again one of the arches had to be restored. In 987, part of the cupola fell, but was restored by Romanus II. from a suspended scaffold. Later, Andronicus the elder [1282-1328], Anne of Savoy, wife of Andronicus the younger [1328-41], and John Palæologus [1358-91], all did minor repairs to the dome or arches; and in 1453, after the scene of slaughter and pillage that followed the siege and capture of Constantinople by the Turks, so wonderfully described by Gibbon, the church was taken as it was, and was converted into a mosque, with few save decorative alterations [1453].

Two of the Sultans—Mahomet II., who built the south-eastern abutments, and Selim II., who repaired the cupola after an earthquake shock—were those who chiefly cared for the fabric; but in 1847 the dome, as well as the church generally, was in such a dilapidated condition that Abdul Medjid summoned Fossati to restore it; while another gentleman,‡ despatched for the sake of research by a

* The word used by Procopius is *λωπος*. The way in which it came to be used in this sense has caused some discussion. A note in a recently-published translation quotes *ἀψίς* in explanation of it. The latter word means firstly, the mesh of a net, then anything that can be bent in a curve or circle, and so for an arch, or even a wheel. *λωπος* (classical *λωπον*), with a somewhat similar meaning—"a thong"—may by the same analogy be used for anything suspended or bent from two points , and is therefore especially applicable to a round-headed arch. The word was never used in this sense, of course, until quite late.—P. S. W.

† So Zonaras; Theophanes and Cedrenus give twenty.—P. S. W.

‡ See *Le Bosphore et Constantinople*, by Dr. P. A. Berthier, &c., Alfred Hölder, Vienna, 1873:—"Les "mosaïques mises au jour par M. Fossati pendant la restauration, et dont il a fait des copies, ont été, *en partie* "seulement, publiées par Salzenberg. Les procédés de ce dernier à l'égard de M. Fossati ne sont pas sans re- "proches mérités . . . que M. Fossati, fâché de cette soustraction, ait conservé toujours inédits dans ses "portefeuilles ce qu'il a copié de ces trésors de l'histoire de l'art chrétien."—P. S. W.

foreign Government, published a most beautiful work, but the information it gave would perhaps have come more gratefully and exhaustively from the clever architect himself, who was engaged for two years upon the work.

CONSTRUCTION.—Placed in one of the finest situations in the world, it is disappointing to find on approaching S. Sophia that the exterior has no claim to beauty. Externally it is bare construction. Huge masses of masonry, painted in stripes of red and yellow, and cupola surmounting cupola, are crowned by the great dome, with its golden crescent, whose outline is too squat to please the eye from a near standpoint. But on entering the mosque it is far otherwise. Surpassing S. Peter's in effect of grandeur and apparent size, the dome has an appearance of lightness, and yet of strength, which justifies the old description of it as suspended from heaven by a chain of gold. M. Choisy [*L'Art de Bâtir chez les Byzantins*, Paris, 1883, p. 185] says :—"Sainte-Sophie étonna les contemporains moins par le luxe de ses mosaïques et de ses marbres, que par la prodigieuse légèreté de sa structure : il leur semblait, pour rappeler la formule tout orientale de leur admiration, que son dôme eût été suspendu dans l'espace par une force invisible, tant les organes de soutènement en sont légers."

There is no long nave to traverse before arriving at the central feature. The cupola is the mosque, and, as it is entered from the narthex, its whole beauty bursts suddenly upon one. Thus the Essayist is concerned more or less with the whole building, as every part of it contributes to the stability of the dome, which depends entirely upon the surrounding masses.

The building [Illustr. xxiii.] is 248 feet by 229 feet, the greater length being from east to west; and the central feature of the plan is not a square—100 feet by 72 feet.* From massive piers spring four arches, upon which rests the great cupola, 104 feet in diameter between the ribs, and rising 179 feet from the pavement, with a height from the springing of 49 feet. The circular form is reached from the square by means of pendentives, and abutment is obtained by semi-domes at the eastern and western ends, themselves having each three smaller semi-domes built against them, thus forming a nave ovoid in form; and on the northern and southern sides by the two supporting arches, by side aisles of two storeys, and by four great buttresses carried up outside on a line with the main piers. The mosque is lighted from the foot of the cupola, a means by which a most beautiful effect is obtained [Illustr. xxiv.].

Such is a bare scheme of the structure, whose history, materials, and construction form, perhaps, a more interesting study than those of any other building in Europe.

As a rule, bricks are used throughout the original building, with the exception of those parts which have to bear the greatest loads, such as the piers supporting the cupola, and, of course, the hundred pillars, marble facings, and mosaics of unsurpassed gorgeousness. Stone† is also used in a course two feet deep which runs all round the building at a height of four feet above the matting-covered pavement; while in some of the later additions, such as the four great buttresses, and in all Turkish work, stone is used combined with brick. As has already been noticed, the fabled Rhodian bricks are nowhere to be found, though it is possible that some such material may have been used in the upper part of the original dome, which entirely collapsed; and those found in the present building are of well-burnt ordinary clay, 14 inches by 9 inches, or 1 foot 2 inches square, and generally about two inches thick. The mortar is of a reddish tinge, perhaps coloured with brick-dust, and is used in joints, in many cases as wide as the bricks, sometimes not more than one inch. When the Romans went to the Bosphorus they still continued to employ their own methods of construction as a rule, while they adopted others from the Eastern builders, together with many Oriental forms.

Though great care was taken with the foundation, which was laid in cement, the eastern end seems to have been less safe than the western; for, in the various earthquakes which shook the fabric, it was at this end that accidents happened oftener than elsewhere, partly, in all probability, from the settlement of the piers. A great platform of twenty feet in depth, covered with a kind of asphalt, was made, which served as a foundation for the church, and "which acquired, when finished, the hardness of iron."

* This is in Prussian feet, and is equivalent to a fraction over that dimension in English feet. It would, perhaps, have been better to give the measurements in mètres, for comparison with the Italian domes; but, as Salzenberg's book is founded upon the most recent and accurate work, the Prussian foot is perhaps the most convenient measure to use—100 Prussian = 103 English feet, and, therefore, 31·692 mètres.—P. S. W.

† Salzenberg states that the stone is throughout a kind of freestone—"eine Art Peperino."—P. S. W.

The piers, which were the wonder of the Byzantine historians, are immensely strong and massive — *εἰκόσαις δ' ἂν αὐτοὺς εἶναι σκοπέλους ὁρῶν ἀποτόμους*. They are of solid stone, the corner blocks being squared and the rest triangular; while beds and joints were all run with lead, and all the stones were connected by clamps of iron [Procop. *De Æd. Jus.*]. As will be seen from the plan, these piers were so constructed as to form the springing of the four great arches and the arches of the four small semi-domes adjoining; and behind them are carried up the four great buttresses, stretching the whole width of the aisles, across which they are carried on arches, and cover a space of 66 feet by 24 feet. The buttresses, however, will be better treated in considering the abutment of the dome.

The north and south arches span a width of 100 feet, while the eastern and western are only 72 feet in length. The two former are, practically, barrel-vaults, of the thickness of the external wall above the *γυναικείον*, or women's gallery, and are filled in with much thinner walls, perforated with two tiers of windows, and carried above the columns which front the two storeys of the side aisles, the lower stage having four magnificent pillars of *verde antico*, said to have been brought from the Temple of Diana at Ephesus (a doubtful story), while the upper stage has six smaller shafts. They are all surmounted

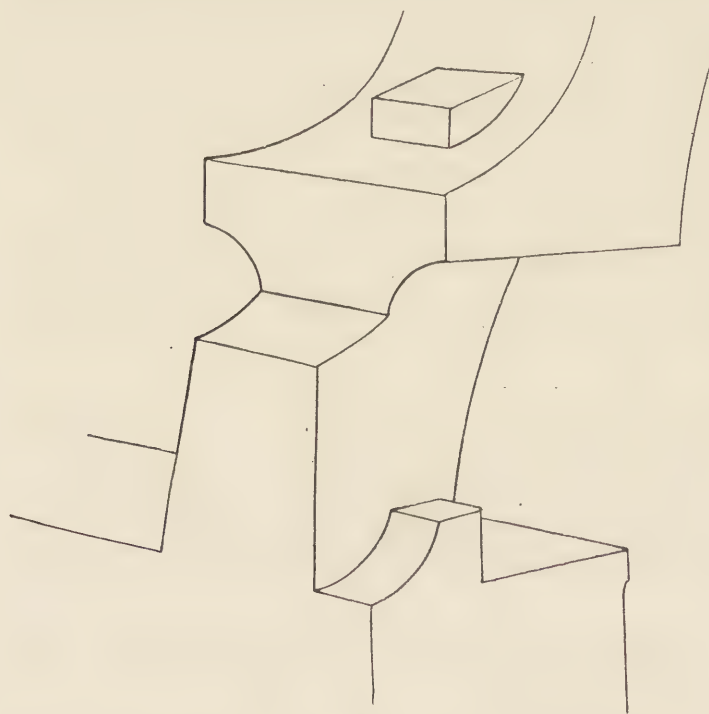


FIG. 1.

REPRESENTING A SLICE CUT OUT OF THE FOOT OF THE DOME.

by semicircular arches, and all wonderfully decorated between and above with characteristic incised arabesques. The haunches of these arches, for about one-eighth of the semicircle on either side, are built in horizontal courses of large bricks, while only the centres radiate from the foot of the opposite side of the arch. The springing of the great arches is brought as low as possible, starting as they do from below the roof of the *γυναικείον* in order to gain all the abutment obtainable. From the junctions of the piers at the level of the arch-springings the pendentives are gradually corbelled over until they terminate in a circle 100 feet in diameter. They are filled in with a stone nowhere else used in the building, which Salzenberg describes as a light white material with numerous fossil remains.*

Behind the pendentives all is solid masonry and brick to the square formed by the meeting of the external faces of the four arches; and at the level from which the cupola springs the whole is flat, so as to form a platform upon which to construct it. So it is at the present time; but, while it was so originally on the east and west, it was not so with the other two sides. On the north and south the platform was narrower than at the east and west, and thus part of the short circular drum of the dome projected above the arches. This space above the arch was therefore filled in to give more resistance to the lateral thrust of the dome, making the platform from which the dome now springs square—a fact which M. Choisy describes, confirming his statement by declaring that he has himself carefully examined this part of the building, and detected a want of bond between the two masses.

* "Nur in den Zwickeln oder Pendentifs unter der Kuppel ist als Füllmittel ein leichtes weissliches Sintermaterial mit Pflanzenabdrücken gefunden worden."—P. S. W.

Upon the flat is built the dome. Unlike any of the four western domes, S. Sophia is lighted round the foot of the dome itself, above the springing, by forty-four windows, divided by piers 3 feet 5 inches by 8 feet 6 inches, and 15 feet high, their sides radiating to the centre of the dome [fig. 1].*

The whole vault is wonderfully light. Curving inwards from the buttresses between the windows, it narrows to 2 feet 5 inches in thickness, and then curves up again, and the vault gradually decreases to 1 foot 9 inches at the crown. Internally, the ribs, starting with a projection of six inches between each of the windows, die flush with the central disc on the inside of the dome. These ribs, however, are not used constructionally, as they were in the west, but were built up at the same time as the rest, and served only as a stiffening for the brickwork. There are several accounts of the building of the cupola.

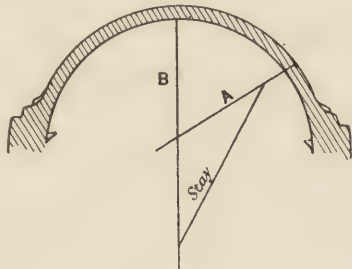


FIG. 2.

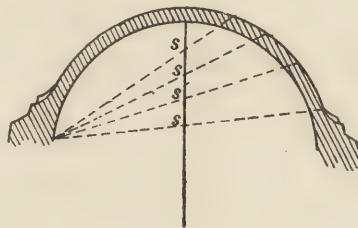


FIG. 3.

Codinus states that light centering was used under each of the ribs, but in no other part; while the following was apparently the method of constructing the cupola:—The bricks, some of which are as large as 27 inches by 9 inches by 2 inches, with joints of about an inch in thickness, radiate, not from the centre of the dome, but from the opposite point of the circumference at its base: the radius being regulated by a pole A [fig. 2], pivoted on a central upright B, which was moved round in order to determine the necessary circumference at each course.† Fig. 3 shows the method of finding the slope of each course of bricks, giving the points s s, &c., as the centres upon which the pole turned round the upright B.

The cupola is covered with lead $\frac{1}{4}$ inch thick, and an iron hoop placed by Fossati round the springing has, it is to be hoped, materially added to its strength.

There are two characteristically Byzantine methods of obtaining abutment to a cupola. The first is by building semi-domes on all four sides; the second by supporting the central dome by four barrel-vaults. In S. Sophia is found a combination of the two—the eastern and western arches having a semi-dome abutting against them, and the north and south arches being in themselves the original abutment for the cupola on those sides. Of these, the first is naturally the stronger; and accordingly, while on the side of the first two arches no extra abutment was needed, the latter had enormous buttresses carried up against them, to prevent their being pushed outwards. Each of these is composed of a large mass, connected to the great pier opposite by walls, varying in thickness—that on the outside being 1 foot 6 inches thicker than the other, in order to give greater strength to the arch opposite it. Thus, inside each is formed a rectangular hollow space, in which the staircases are placed, communicating with the interior of the church at the levels of the *γυναικείον*, the gallery above the piers, at the springing of the arches; and ascending thence to the gallery in the dome, from which access is obtained to the external platform.

The chief weakness in S. Sophia lies in the fact that the arches of abutment form the external walls of the building [Illustn. xxv.]—a defect remedied in S. Sophia at Salonica, in Sulimanièh at Constantinople, and in the beautiful mosque of Selim II. at Adrianople,‡ by transferring them to the inside of the building.

* See Salzenberg, p. 21, for the original treatment of the projection above each pier.—P. S. W.

† See Elton's *Survey of the Turkish Empire*, 1801, pp. 221-23; Guys's *Voyage Littéraire de la Grèce*, 1783, vol. ii. p. 2; Andréossy, *Constantinople et le Bosphore de Thrace*, 1828, p. 120.—P. S. W.

‡ It is to be hoped that the new railway and the more settled state of the country will enable more travellers to reach this quaint and genuinely Turkish town, with its wonderful mosque, fine both from its natural position and internal and external architecture.—P. S. W.

Besides that afforded by the semi-domes and the large buttresses, abutment is obtained by means of the two side aisles. The series of buttresses formed by the rows of arches, connecting on each floor the inner wall and the outer, which is strengthened by barrel-vaults, form a number of supports. The roof slopes upwards and abuts against the inner wall, above the line of the arch-springings, and adds materially to the strength of the walls, while every inch of space is available. Indeed, one of the chief characteristics of S. Sophia is the great strength of abutment obtained, while only one-tenth of the whole area of the building is occupied by its supports ; another, the wonderful way in which, without any attempt externally to conceal the bare construction, internally every such feature is converted into one of beauty and infinite variety.

The Duomo, Florence.

HISTORY.—Towards the close of the thirteenth century the Florentines determined to build a church which should surpass all previous efforts and leave nothing for future ages to accomplish. The attempt was entrusted to Arnolfo di Lapo, and either in the year 1295 or 1298 the first stone of S. Maria-del-Fiore was laid. The former of these dates is the more probable, as, at the architect's death in 1300, the work was too far advanced to allow of its having been commenced but some two years before.

Great care was bestowed upon the foundations, which were very solidly constructed to carry the great piers ; and at the death of Arnolfo most of the church was completed, with the exception of the particular feature which is to be considered, while it is open to doubt whether Arnolfo was competent to roof the octagonal space which he left uncovered. In 1300 Giotto took up the work, but confined his attention to the wonderful Campanile which bears his name, and was followed by Taddeo Gaddi, Andrea Orgagna, and Lorenzo di Filippo. None of these had apparently the least idea as to the way in which a dome should be constructed upon the substructure which had been completed to the level of the cornice above the great arches.

Years afterwards, Brunelleschi, who had his ideas upon the subject, studied the ancient examples—more especially the Pantheon—until he arrived at a definite conclusion. In the year 1407 a meeting of architects and engineers was held at Florence to consider what was to be done ; which assembly came to the conclusion that to build a dome over the space left by Arnolfo was impossible. However, having heard that Brunelleschi had studied the question, he was asked to give his views as to the practicability of so doing. Without telling them the whole of his scheme, he advised that the tambour should be raised 15 braccia, in order both to receive the roof of the nave, and also to form a drum on which to construct his dome, and that circular windows should be formed in the eight sides of the drum so constructed. His advice was followed, and when the work was well forward another meeting was held. Fearing at present to communicate his scheme, and thinking that the timidity of the *savants* would not countenance his daring project, until, at any rate, they had learnt their own helplessness, the architect left Florence ; but the conference, unable, as he had expected, to come to any decision, and remembering the architect's confidence in his own skill, was soon compelled to send for him to return. He wished to gain time for maturing his plans, and advised that a great meeting of experts should be convened from all parts of Europe to consider the matter, and his recommendation was again acted upon. Architects and engineers of the greatest name collected from the East and the West, the North and the South, and in 1420 were seated in solemn conclave, proposing what seemed to Brunelleschi many childish expedients. Some wished to raise huge wooden scaffolds from the floor of the church, others to fill up the space inside with earth, so as to form a kind of mould, in which should be buried small coins, for which the populace might scramble when the dome was finished, and so the "*auri sacra fames*" might remove the pile. When Brunelleschi, who is said to have convened the assembly partly for his own aggrandisement, promised to construct the dome without any such supports, and so save great expense, they jeered at him ; and, as he would not stop talking, they had him carried out as a madman. Disgusted with such proceedings, the architect began to canvass privately among his opponents, and at last, either by convincing them or procuring their silence, obtained leave to begin the work. But he would not yet expose his hand by showing the model ; he instead satisfied the syndics by drawing up an elaborate report, in which he explained how he proposed to construct the various parts of his vault—a report which will be better considered later on than in this place.

Satisfied with this, together with the fact that he had already successfully built two domes—those of S. Felicità and S. Jacopo-sopra-Arno—the syndics allowed him to proceed, on the condition that if, on the completion of twelve braccia, the work was not to their satisfaction he must proceed no further. Such a restriction was hardly agreeable, and, to add to the architect's chagrin, Lorenzo Ghiberti was appointed as his colleague with equal pay.

Very soon an open quarrel broke out between Brunelleschi and Lorenzo, in consequence of the former refusing to show his model. Brunelleschi then, finding that his colleague was utterly incompetent, as soon as the twelve braccia were finished, feigned illness; and his absence, which proved Lorenzo's incapacity, brought the work to a standstill. The wardens visited him, and complained that nothing could be done in his absence, and that Lorenzo would do nothing without him, to which he made answer:—"Ah! but I could do it very well without him!" They then divided the work, and while Brunelleschi's share—the scaffolding—was successfully carried out, his colleague's ignorance was fully exposed when he came to work upon his own responsibility. Lorenzo was dismissed from his post, and thus Brunelleschi was installed sole architect for life, with increased emoluments, which, however, scarcely compensated for the annoyance to which he was put by the jealousy and enmity of Lorenzo and his party.

The works now progressed rapidly. A strike instigated by Lorenzo failed to stop them, and shops and buildings for the safety and convenience of the workmen were erected on the scaffold itself. Stones and ironwork were modelled by the architect on the spot, and everything proceeded smoothly, until his enemies procured Brunelleschi's incarceration, on the ground that he had failed to pay the tax levied on every artist for the right of pursuing his calling. He was, however, promptly rescued, amid much indignation, and his enemies were imprisoned in his stead.

In 1422 the brickwork of the dome was commenced; in the following year the wooden ring was laid; and in 1425 the second passage was constructed. The year 1428 saw the completion of the third passage round the dome, and in 1431 the vault was finished; but the lantern was much delayed owing to the envy of the enemy, who presented models in great quantity—among the authors being Lorenzo and a lady. However, though Brunelleschi did not live to see the completion of his work, the lantern was begun in the year of his death, 1444, so that he had the satisfaction of seeing its essential part brought to a successful termination.

In the year 1471* the ball at the summit of the lantern, which was the work of Andrea Verocchio, was fixed, and thus the whole building was finished.

Between the years 1492 and 1600 the dome was struck by lightning sixteen times, and, on various of these occasions, the lantern was injured, and huge masses of marble dashed off the external gallery at the foot of the dome; while in 1600 the ball and cross were hurled on to the building below, but replaced in the following year on a larger scale than before.

In the beginning of the seventeenth century great alarm was caused by reports that the dome was cracking and unsafe,† and Fontana urged that the tambour should be encircled by four iron bands. But he was not listened to, and it was found that dovetailed cramps of brass introduced by Nelli were all that was required, and that the cupola was perfectly safe; and perfectly safe it has remained. It stands a marvel of constructive ingenuity to throw into the shade the meagre and ill-proportioned nave of Arnolfo di Lapo.

CONSTRUCTION.—The dome of S. Maria-del-Fiore is entirely different from those of the Pantheon and of S. Sophia, and, though Brunelleschi made his chief studies from the former, he was tied by the work of Arnolfo, and could not therefore take it for his model, in the same way that the dome of S. Peter's was taken from that of the Florentine church. Brunelleschi, in spite of the protests of certain authors, may be credited with having not only covered the largest space domed since the erection of the Pantheon dome, but also with having invented new methods of constructing his vault, which, while it had the same diameter as that of S. Peter's, was much stronger and more durable.

The probability is that Arnolfo's model had been destroyed before Brunelleschi took up the work. At any rate, he never seems to have seen it; while it is not unlikely that Arnolfo did not

* So Prof. Durm; Vasari and Quatremère de Quincy give 1469.—P. S. W.

† The cracks were caused by the sinking of the two southern piers; but were slight, and had probably existed from the beginning.—P. S. W.

himself know how the octagonal space in the centre of his church should be roofed,* and that his death covered his ignorance, while it left no clue to his intentions. Brunelleschi's design was the result of years of careful study and secret work, with a view to the completion of the dome, whose construction it was his ambition to carry out; and his erection of the cupola upon a tambour, raised high above the surrounding masses, was in itself a new and venturesome departure that cannot be admired too much. Brunelleschi had, however, an advantage afforded to few architects—that of the already-settled state of the substructure upon which he had to build.

The dome and the three apses, with the smaller projections between them which surround it, form the choir of the church and its chief beauty. These would, in Arnolfo's design, have formed abutment for the roof of his octagon, which would probably have sprung from the lower cornice; but they cannot be said to afford any strength to Brunelleschi's dome, whose lateral thrust is removed forty feet above them; neither is any abutment afforded, as at S. Peter's and S. Paul's, by a peristyle.

The plan [Illustrn. xxiii.] is octagonal, and around it are arranged, on the north, south, and east, the three apses just mentioned, with four smaller projections between and adjoining, all of which are roofed just under the lower cornice, as will be seen in Illustrn. xxv. On plan the arrangement of piers seems peculiar, and will be described in detail later on; but the octagon is carried up all through the vault, which is practically formed by four pointed arches, and into the lantern which forms their common keystone. The height from the pavement to the cornice above the great arches is 57·57 mètres,† and from there to the lantern is 32·30 mètres, while the total height from the pavement to the cross is 117·887 mètres (154 braccia). The tambour is 8·75 mètres high, and its diameter, which fixes that of the dome, is 139 feet [Illustrn. xxiv.].

The following materials are used in the various parts of the dome. Trassinean and macigno stone are employed for the masonry, the latter in the bond-stones of the vault and such positions as require a hard material; while the brickwork of the dome above the second passage is composed of large bricks weighing from 25 to 30 lbs., which were preferred to the pumice-stone which Brunelleschi proposed as an alternative. The exterior of the tambour, as of the rest of the church, is faced with different-coloured marbles; while the stone ribs projecting above the dome are cased in moulded marble. The covering is of tiles, which were fixed in a bed of mortar spread over the dome [Illustrn. xxv.].

The four cardinal arches are of similar height and width, crossing the entrance to the three apses. The piers which carry the western arch are comparatively small, placed in a line with those of the nave; while from them also spring the smaller arches, which cross the transepts and rest upon the two large oblong piers north and south. The two eastern piers are, roughly speaking, equilateral ‡ on plan; with large square recesses formed inside them from which the staircases ascend. The internal wall is carried up flush from the ground to the springing of the vault, and outside the equilateral form is roofed against the drum at the same level as the apses, while the wall of the tambour is continued above with a thickness of 5 mètres. Thus it is, perhaps, more correct to speak of these features as buttresses than piers, for while they support the dome the larger part of them is outside its octagon.

The general principle of the dome is shortly put in Brunelleschi's Report.§ Its springing is not on a line with the inner cornice, but at that of the passage in the arcading, which originally extended

* Quatremère de Quincy, in his life of Brunelleschi, remarks:—"Il paraît même qu'Arnolphe, dans la conception d'un vaste plan, qui demandait, pour la réunion de ses quatre nefs, l'addition d'une voûte immense, telle qu'il n'en existait aucun exemple, même dans l'antiquité, avait entrepris beaucoup au-delà des connaissances de son siècle, et fort au-dessus encore de ses forces."—P. S. W.

† It seemed better, for convenience' sake, to reduce all measurements to mètres, partly for simplicity, and partly to facilitate comparison with S. Peter's. A braccium = 5830 mètres.—P. S. W.

‡ Not strictly true. The angles are cut off, and thus the projection externally presents a three-sided figure, or half hexagon.—P. S. W.

§ Brunelleschi's Report to the Convention which sat at Florence in 1420 is briefly put in for reference in the description of the dome's construction, as follows:—

(1) The inner dome is to be turned from the octagon as pointed arches, which are better adapted to carry the weight of the lantern.
(2) The thickness of this vault at its base is to be $3\frac{3}{4}$ braccia.
(3) The vault shall gradually decrease to $1\frac{1}{4}$ braccium.

all round the foot of the cupola, and a great part of which has been broken away. Above the cornice the wall is constructed of solid masonry. At this level the first passage surrounds the dome, and from here the two vaults divide, the outer being a thin casing of 1·313 mètre at the foot, and gradually diminishing. The two vaults are constructed about a series of ribs. Eight large ribs spring from the angles running through the whole thickness of the dome, while between each pair are two smaller ribs, connected to each other and the angle buttresses by arches. These ribs terminate in an eye, above which is the lantern. Such is a general outline of the dome.

Up to the height of 17·51 mètres the work apparently was carried on without scaffolding, and of the framework used above that point there is a somewhat confused account by Nelli. Horizontal timbers were built in just above the cornice, and supported by others fixed diagonally below. Framed into these were stays, supporting great beams, which, at their lower end built into the wall, carried the highest platform just under the lantern. These were strutted from a central beam connecting the two upper platforms. Horizontal rings carried the two lower platforms, and ladders communicated between all three stages. Upon this scaffolding, Vasari states, were built shops and restaurants, in order that time might not be lost and life endangered by frequent ascending and descending.*

Brunelleschi's Report to the Convention [see note §, page 178 and below] formed a kind of specification, in accordance with which the dome was built, but variations from it will have to be noted in one or two particulars.

For 3·064 mètres the wall of the dome is built of solid stone. Each stone is laid lengthwise, and dowelled to each with iron dowels; long iron clamps a few feet from each face bind them to the ribs, and thus a solid foundation was formed upon which to raise the dome [Report, § 6].

(4) The second vault to be constructed outside the first to preserve the latter from the rain. It shall be $2\frac{1}{2}$ braccia at its base, and at the top two-thirds the thickness of the base.

(5) There shall be a buttress at each angle, which will be eight in all, and between the angles in face of each wall there shall be two—sixteen in all, and these sixteen buttresses on the inner and outer side of the wall must have the breadth of 4 braccia at the base.

(6) These two vaults, built in the form of a pyramid, shall rise in equal proportion to the height of the round window closed by the lantern.

(7) There will thus be constructed twenty-four buttresses, with the said vaults built around, and six strong and high arches of a hard stone (macigno), well clamped and bound with iron fastenings, which must be covered with tin; and over these stones shall be cramping irons, by which the vaults shall be bound to the buttresses.

(8) The masonry must be solid, and must leave no vacant space to the height of $5\frac{1}{2}$ braccia; the buttresses being then continued the arches will be separated.

(9) The first and second courses from the base must be strengthened everywhere by long plates of macigno laid crosswise in such sort that both vaults of the cupola shall rest on these stones.

(10) Throughout the whole height, at every 9th braccia, there shall be small arches constructed in the vaults between the buttresses with strong cramps of oak, whereby the buttresses by which the vault is supported shall be bound and strengthened; these fastenings of oak shall then be covered with plates of iron, on account of the staircases.

(11) The buttresses are all to be built of macigno or other hard stone, and the walls of the cupola are in like manner to be all of solid stone bound to the buttresses to the height of 24 braccia, and thence upwards they shall be constructed of bricks or of spungite.

(12) On the outside, a passage above the windows shall be made which below shall form a terrace with an open parapet or balustrade, 2 braccia high, . . . forming two galleries one over the other placed on a richly decorated cornice, the upper gallery being covered.

(13) The rain-water shall be carried off the cupola by means of a marble channel a third of an ell broad, the water being discharged at an outlet of hard stone beneath the channel.

(14) Eight ribs of marble shall be formed on the angles of the external surface of the cupola, of such thickness as may be requisite. These shall rise to a height of 1 braccia above the cupola, with cornices projecting in the manner of a roof 2 braccia broad, that the summit may be complete and sufficiently furnished with eaves and channels on every side, and these must have the form of the pyramid from the base or point of junction to this extremity.

(15) Thus the cupola, constructed without framework to the height of 30 braccia, from that height upwards may be continued as shall be determined by the masters who build it.—P. S. W.

* See [TRANSACTIONS, 1883-84, pp. 160-61, Illustr. xli.] a view of the scaffolding (taken from G. B. Nelli's *Discorsi di Architettura*, 4o. Florence, 1753, p. 74) used in the erection of the dome of S. Maria-del-Fiore.

From a bed of macigno, running all round the dome, spring the twenty-four ribs. The sixteen smaller ones were specified by Brunelleschi as 4 braccia in width at the base, but, as executed, they are not quite so wide, and run through the thickness of the dome, while the angle ribs are twice the width of the smaller ones, with of course the same depth. They are all, in common with both the casings, constructed up to the top of the second passage, whose floor is at one-third of the height of the cupola, in courses of sandstone radiating from the centres of the arches; and thus both ribs and vaults, bonded into one another and built of stone, form one solid mass upon which to build the higher parts. Above this, large bricks [Report, § 11], weighing from 25 to 30 lbs., are alone used, with the exception of bond-stones, of which mention will presently be made. The large ribs project from the outer vault and are cased in marble, moulded on the top, and projecting on either side so as to form, Brunelleschi states, eaves in order to throw off the water [Report, § 13], and then finish in a circular and similarly-moulded rib round the foot of the lantern.

The outer and inner vaults themselves, which spring with thicknesses of 1·313 mètre and 2·188 mètres, do not both agree with Brunelleschi's original intentions. The outer does decrease at the summit, as he describes in his report, to about two-thirds of its lowest width, but the inner keeps much more nearly to the same thickness throughout its height. Both are of brick above the sandstone before mentioned—not, as at S. Peter's, arranged in herring-bone form, but in courses radiating from the centres of the dome.

Between the vaults is a cavity, somewhat more than a mètre in width, which separates the casings from top to bottom of the cupola, and in it are three passages running round the circle, connected with one another by staircases. The first of these has been mentioned as close above the springing; while the two others are placed at one-third and two-thirds the height of the dome respectively, with doorways through each of the ribs. The floors of these two upper galleries are so arranged as to form an extra bond between the two casings. In the space between each rib there are three cross-ribs of macigno stone, with either end bedded into the casings, and forming beams upon which to lay the stone floors of the passages. Thus, at the levels of the second and third galleries, there are ninety-six bond-stones between the vaults.

The most characteristic feature, however, of the dome is the series of arches springing from the large ribs to act as cross-buttresses. These, says Brunelleschi, were to be constructed every 9 braccia; but Durm describes them as only beginning above the second gallery, where a triangular stone, horizontal on its lower bed, forms a seating for the first of these arches, built at right angles to the outer vault. Each springs from the flanks of the main ribs, and, curving back, is built into the opposite flanks of the smaller buttresses; whilst merging in the outer vault, it continues between the two minor ribs, thus forming a complete arch, tying each rib to the next all round the dome, and the outer dome to the ribs.

Within the ribs, at a level with each of these arches, are ties running the whole thickness of the vault, described by Brunelleschi, but executed in iron, instead of oak cased in that metal.

What Brunelleschi means by "six strong and high arches" in paragraph 7 of his Report I am rather at a loss to know, but conclude that he refers to the rings of macigno which bind the whole construction together. These are six in number, corresponding to the "six strong and high arches of a hard stone," and I suppose that in execution they were altered from his original intention. In saying that there are six of these courses of macigno, forming as many girdles in the dome, it is meant to include the one at the foot of the dome; but Brunelleschi could hardly have described that as an arch.

The inner casing is carried up to the eye, and forms the foundation from which the lantern rises directly, but the outer only forms a support for the abutment of the lantern, and, finishing in a larger radius than the eye, butts against the outer wall of the passage, round its circular opening. This wall forms the last bond between the two vaults, and, rising at right angles to the circumference of the dome, supports the platform on which the lantern is built, while the main ribs continuing to the eye carry the body of the lantern.

There is one important constructional feature which has not, so far, been noticed. This is the great tie which, above the first passage, encircles the dome. It is a peculiar contrivance. A huge beam of chesnut wood was laid from rib to rib; a change of direction being then needed, it was mitred and laid against the corresponding ends of other beams which spanned the next spaces. A

fishplate of oak was laid underneath the two pieces to be joined, which stretched through the ribs; a band of iron was placed round, and wedges of oak driven in above to tighten the whole up together, and a pin driven through them, when they were solidly built up all round, the extremities of the joints projecting from the ribs. It is placed with the lintels of the doorways in the lowest passage beneath it, and a triangular stone notched out to receive it above, which forms, as before described, a seating for the first arch. The beams are 66 by 33 mètre.

Circular staircases ascend inside the piers, and run straight up to the top of the drum, whence passages lead to the inner cornice and the outer gallery. Steps from this gallery land in the cavity between the vaults, and by an ascent of seven steps the first passage of the dome is reached. The two upper passages are reached by stairs following the circle of the dome, and the last part of the ascent to the passage round the eye is made by steps cut on the extrados of the inner casing. Steps are constructed on the sloping wall of the passage, which arrive on the lantern platform, and thence a circular well, with a recess in which rings are fixed, provides access to the upper part of the lantern and ball.

Brunelleschi's idea as to the use of the two vaults is gathered from paragraphs 1-4 of his Report, and from what Vasari states. The work of the dome was to be done by the ribs, while the filling-in merely strengthened them, and the cavity lightened the structure. The outer casing was merely to protect the inner, which was made the thicker, in that it had to bear more of the lantern's weight and also the strain of the ties; while the octagonal form was not converted into the round, because the arched form was better calculated to sustain the weight of the lantern than the circular. The wooden ring prevents any tendency to fall outwards, and is placed for that purpose at the most necessary point, while the arches prevent the vault falling inwards. There has been no failure in this dome, with the exception of a few trifling cracks, which Cecchini pronounces as old as the building.

S. Peter, Rome.

HISTORY.—The end of the fifteenth and beginning of the sixteenth century was one of those periods in the world's history which have had a pre-eminent influence on succeeding ages. As throughout Italy, so more especially in its capital, religious zeal found expression in art, and produced a wealth, magnificence, and luxury of design such as has never been equalled, and which awoke a last echo of Horace's great public hymn [*Carm. Sæc.*, S. 3].—

Alme Sol, curru nitido diem qui
Promis et celas, aliusque et idem
Nasceris, possis nihil urbe Roma
Visere majus.

Papal and legatine extortion, especially in Germany, had placed at the disposal of the See of S. Peter ample means to gratify the promptings of the age, and Julius II.,—in spite of, and perhaps to spite, dissentient cardinals—with his characteristic impetuosity and impatience of opposition, plunged headlong into the works at S. Peter's, abandoned at the death of Nicholas V.

Julius II. had not long been installed as Pope when the foundations of Bernard Rossellini were discovered, and the idea of abolishing the old Basilica of S. Peter's seized upon the energetic pontiff, and of building a new church such as, from its size and magnificence, should be the wonder, as well as the centre, of the civilised world temporal and spiritual.

Bramante was forthwith commissioned to make his plans and models. As the present account is only concerned with the dome, the history of that feature is alone required here. The first stone of the four central piers which were to carry the dome was laid by Bramante in April 1506. Like all subsequent designs and models up to the time of Fontana, of which many were made, the dome of Bramante was founded on that of the Pantheon. He had carefully studied it, as well as that at Florence, and all his designs for the cupola, of which several exist, were more or less copies of that building.

Julius hurried on the building with undue haste, and Bramante (with whom Julian San Gallo was associated), either from carelessness or unwillingness to offend a patron upon whom so lucrative a post depended, did not take due precautions as to the foundations, but built his massive piers upon ground

hastily prepared, and entirely unfit to carry them. The four piers were finished, and the arches turned upon them before any of the rest of the building, which would have served as abutment to the arches, was built. The consequence was that they began to spread and push the piers out; cracks appeared in all directions, the foundations began to sink, and the whole fabric threatened to come down. The ground upon which the building had been commenced had originally been on the slope, and the ruins of the Circus of Nero remaining upon the surface had been built over, while springs were afterwards discovered underground. No wonder that under the pressure of the arches the piers gave way!

At this juncture Bramante died, in the year 1514, and a consultation was held by Raphael and the two San Gallo. It was decided to strengthen the piers. Raphael was appointed architect in the next year; but his design, which is said to have been marvellously fine, has been lost, and at his death in 1520, during the pontificate of Leo X., his place was taken by Peruzzi, whose design is also said to have been very beautiful; but want of enterprise on the part of architect and Pope, combined with the untoward turn of events, effectually stopped the works of the dome. Between 1520 and 1527 the architect did nothing important, and, in the latter year, the sack of Rome by Bourbon and Frundsberg resulted in a general upset and the captivity of Clement VII. Adrian VI., who followed Clement, was too humble and self-denying to spend anything upon his own aggrandisement, or to take any pride in marking his term of office by great public works. Peruzzi and Anthony San Gallo spent most of the money at their disposal upon the foundations. Under Paul III. San Gallo made a model for the dome, which, however, was strongly denounced by Michel-Angelo, who, at San Gallo's death in 1546, in spite of opposition, became sole architect.

Determined that he would so advance the building that no material deviation from what he felt to be the right thing could take place, he completed the drum in 1557, and then, feeling that he was growing old, obtained Vignola and Pirro Ligorio to help him, through the influence of Pius V. He died at the age of ninety, in 1564, having gained his object.

The cupola designed by Michel-Angelo had the same diameter as that of Bramante, the curve of whose vault he took for his inner casing, while for his outer he adopted that of Peruzzi; and by constructing it in two thicknesses, with ribs running through, he considerably lightened its weight.

The honour of completing S. Peter's was reserved for that enterprising and ambitious Pope Sixtus V., and his architects, Giacomo della Porta and Fontana. They heightened the dome, making it pointed instead of hemispherical, and at the death of the Pope all was finished except the outside covering of lead, which was added by Clement VIII.*

In 1743 the vault showed signs of failing, and one of the ties put in by Fontana burst under the pressure of the lantern. For the next five years the dome caused great anxiety, and every effort was made to keep it up with iron bands placed round the outside of the dome. In this year two new ties were placed round the exterior at the foot and summit of the dome; but these not proving sufficient, in the next year three others were added. Still it was found that the cupola was unsafe, and in the year 1748 a final ring was fixed just below the passage of the dome, since whose insertion the dome has remained unmoved.

Thus the building of S. Peter's occupied above a hundred years, through delays caused by changes of Popes and architects, by political factions, and petty jealousies of too frequent occurrence even to mention here. According to Quatremère de Quincy, "Le jésuite Bonnani faut avouer que peu de monuments ont subi, avant d'être terminés, autant de variations."

CONSTRUCTION.—Though the dome of S. Peter's was founded upon that of the Pantheon, under various hands it gradually assumed another shape, while in plan [Illustrn. xxiii.] it more nearly resembles S. Sophia than that of the Rotunda. There are the same four massive piers; a dome whose inner circumference, while it rests upon four great arches, is described, as at S. Sophia, within the piers; and lastly, in consequence of this, the square is converted into the round form by means of pendentives,

* "Sixtus V. ædificationem totam novi templi, Petro Apostolo dicati, penitus absolvit; at plumbeis tegere laminis, ornamentaque quæ animo destinarat adhibere, templique pavimenta sternere non potuit, morte sublatus. At quæ supersunt Clemens VIII. persecutus perfecturusque creditur, qui tholum ipsum plumbeis jam contexit laminis, sanctissimæ crucis vexillum æneum inauratum imposuit . . . totique templo aptando et exornando diligentissimam dat operam. Cum vero ex Michaelangelis forma erit absolutum, antiquitatem omnem superabit."—MS. Life of Sixtus V., by Guido Gualterio Sansovino [quoted in Ranke's *Lives of the Popes*].—P. S. W.

though on a smaller scale than in the Byzantine dome. The vault, however, is not solid, but, as at the Florentine Duomo, consists of a double shell constructed between strong ribs, the inner of which is a little removed from the semicircle, while the outer rises considerably higher than the inner casing. Indeed, the main difference between the vaults of S. Maria-del-Fiore and S. Peter's lies in the fact that, while in the former there is little difference between the inner and outer curve of the dome, at S. Peter's the difference is very considerable. The vault is raised high above the body of the church, on a tambour 42·769 mètres in diameter, thus fixing the size of the dome, surrounded by a peristyle, which is the only abutment given to the dome. The height of the dome from the pavement is 101·535 mètres [Illustrn. xxiv.].

And now, beginning from the foundation, it will be well to work upwards through the various parts. As to the foundations something has already been said. Utterly inadequate to bear the weight of Bramante's piers, Peruzzi and Fontana did much to strengthen them by consolidating the ground, since which time there has been no sinking, the subsequent failure being due to the weight of the lantern. The piers are of solid Tivoli stone, and of immense size. Of these there are four, from which spring the great arches that carry the dome. Originally they were built by Bramante with semicircular recesses on the two outer sides, which San Gallo filled up to add strength and power of resistance to the lateral thrust of the arches; and there now exist shallow recesses in their place.

The arches were constructed on very strong centering, and, as I understand Dumont, a hole was left through their crowns by which to pass ropes to the men who were working at the scaffold. They spring from pier to pier with a soffit of 8·930 mètres, and this determines the thickness of the walls up to the level of the flat below the great external cornice. From the arches rises the tambour, necessitating at the angles a change from the square, made slightly octagonal by the canted sides of the piers, to the circular form. The drum rests upon the crowns of the arches, and from the angles at their springing the wall is corbelled gradually out in the form of pendentives, which, owing to the form of the piers, are comparatively slight; so that, while it rests upon the pendentives, it has a bearing over the piers themselves. Instead of, as in S. Sophia, having to fill up a large angle, the corbels are not far removed at their base from the circle they carry. In a Byzantine example it is often as if the cupola is placed upon a vaulted square, whereas at S. Peter's the corbels are not curved, but rise with a straight line to the base of the tambour. From the podium of the peristyle rises the drum, with a thickness of a little less than 3 mètres, leaving a broad platform outside on which the peristyle is built, and is carried straight up to the springing of the dome, the height to which Michel-Angelo saw it raised before his death. It is from this part of the dome that light is admitted by sixteen windows, which are placed between the buttresses outside. These buttresses each consist of coupled Corinthian columns connected to one another and the drum by masonry, as in the eight larger buttresses of the peristyle at St. Paul's, and surmounted by an entablature which runs all round the dome. These form the only abutment.

While the inner dome springs from the highest internal cornice, the outer curve is described with its base resting upon the external attic. The outer and inner lines are described from different centres, and therefore are not parallel in any part of their course, as is almost the case in the Duomo at Florence.

Fearing that the section of Michel-Angelo's dome would be unequal to the weight of the lantern (raised though it had been from the semicircular to a slightly pointed form), Fontana heightened it still more, also making the external outline rise higher than it had been intended from the internal curve. But this was not, as it turned out, sufficient; and the event proved that had either a lantern of lighter build been placed upon the summit of the dome, or the curvature made more nearly to resemble that of Brunelleschi's dome, the stability of the structure would have been better assured.

The vault is carried by sixteen ribs of solid Tivoli stone, which rise from above the peristyle at the springing of the inner dome, and which project from the vault with moulded summits, as at Florence, and stop in a similarly moulded rib round the foot of the lantern. They are in width much narrower at the top than at the bottom, while in depth they increase to about double the thickness of the wall at the springing. Narrowed, not gradually, but in three sets-off, they finish against the eye with a width of about one-third of that at their base, and a depth increased to 4·720 mètres.

As at Florence, there are two casings of brick, but without the various bondstones and ties inserted in Brunelleschi's dome. They are of bricks set in herring-bone form, the inner 1·846 mètre, the

outer .87 mètre in thickness. These are separated, at about two-fifths the height of the dome, by a passage which surrounds it; while, above this, the space formed between the ribs and the casings is entirely clear and lighted by three tiers of loopholes. No bond, besides that of the ribs, was inserted between the two vaults after their separation, which Fontana considered would be strong enough to resist any lateral thrust and to carry the weight of the lantern.

Round the eye of the lantern runs a passage, formed on the back of the lower casing, and above this the platform of the lantern rests upon the top of the ribs, which are connected by arches round the outer side of the passage.

The lantern is a very important feature in the dome of S. Peter's, since to its weight was due the subsequent failures of the eighteenth century, or rather to that weight when placed upon the particular curve which supports it. With a vault below, whose section was much weaker than that of the Florentine Duomo, the lantern has almost the same dimensions as Brunelleschi's, but is of heavier build. The diameter of the eye is $5\frac{1}{2}$ mètres, as against $5\frac{3}{4}$ in the building cited.

The lantern has sixteen sides, with as many windows and buttresses corresponding to those in the peristyle below, and the haunches of its vault are filled up solid to form a flat platform, on which stands the roof [Illustrn. xxv.].

The arrangement of the staircases is more complicated than in any of the other four domes. A circular staircase up the centre of each of the great piers emerges outside the circle of the dome, at the foot of steps which lead to the level of the lowest passage surrounding the drum, and from this a second passage is reached, from which are four flights of steps, giving access to the inner and outer cornices. Following the circle, stairs emerge upon the platform of the peristyle, behind four of whose buttresses spiral staircases lead up between the windows to the passage in the dome. From this point, as in the upper part of the vault at Florence, steps are formed in the back of the inner casing in the alternate spaces between the ribs, by which the passage round the eye is gained, and circular stairs constructed between the ribs then ascend to the lantern platform. By a staircase in a buttress of the lantern, and steps cut through the brickwork of the vault, the roof is reached, whence wooden and iron ascents give means of climbing to the ball.

As to the number of ties, and their position, in the vault of S. Peter's authorities differ. Including those originally inserted, I understand Professor Lewis to say that there are ten; Professor Durm gives nine. Fontana shows three iron ties as originally inserted—two near the extrados of the inner dome, the first just above the passage, and the second about four mètres above it, while the third is about the same distance below the first. An author I have consulted places one of the original ties at the foot of the dome, which he says burst in 1743, when another was added outside, together with two others just above it; while one at the foot was added in 1744, as well as one at the top and another at the centre of the dome. Professor Durm only places the three last-mentioned ties in the year 1743—that being, according to him, the year in which those at the top and base of the dome were fixed, while he adds that of 1748 just below the passage round the vault. The internal ties (all the latter ones were applied externally and run through the ribs), fixed originally by Fontana, were fastened into the vault at intervals by cross-pieces, which bonded them into the brickwork above and below. In the tambour there is also a series of iron ties binding the thickness of the wall together. But, whatever the number, it is certain that the boast of Fontana* as to the stability of his dome was hardly justified, as, well within a century after the writing of his book, it was cracking in several places. As to the tie of 1748, Professor Lewis says, "If my theory of domes be correct, this tie is the only one required";† and, at any rate, it effectually stopped any tendency to spread in the dome.

Following the example of Brunelleschi, Fontana made his inner vault the thicker, because it was the one upon which depended mostly the tie between the ribs, and which, though the object of the ribs was to carry the lantern, also bears part of its weight, as well as helping to resist its thrust. The

* "Firmissima partium foundationumque adeo elucescit compages, ut de illius perennitate suspicari queat nemo."—*Templ. Vat.*, lib. v. ch. xxi.—P. S. W.

† See *TRANSACTIONS*, 1858-59, p. 118. Therein Professor Lewis, in a Paper on the "Construction of Domes," stated that (a) the essential element of strength is a straight cone (whether simple in one unbroken length, or compound in two or more lengths), comprised within the section of its vaulted covering; and (b) that the base of each cone must be securely tied.—P. S. W.

outer casing merely acts as an extra tie, and as an abutment for the lantern, without in any way supporting it, while it allows of access to the dome under protection. By building two casings the weight of the vault was reduced, and by increasing the depth of the ribs as they ascended a stronger section and a finer external outline were obtained. This is absolutely necessary in the case of a dome so little removed internally from the semicircle as is S. Peter's, if it is to stand upon a tambour without abutment, though a straighter section, like that of the Florentine Duomo, may do so without any fear of failure.

S. Paul, London.

HISTORY.—S. Paul's Cathedral is a church with little history. The demolition of the old cathedral and the erection of the new were carried out by the same architect; but there is little of the interest attached to the building of S. Maria-del-Fiore to be found in the speedy erection of both church and dome, and none of the ambiguity that surrounds the origin of the Pantheon; while the antiquity of S. Sophia, and the vicissitudes that attended the erection of S. Peter's, give to those churches an element wanting in S. Paul's. The first model * made by Sir Christopher Wren was rejected, and this is still kept at the Cathedral.

The building was commenced in 1675. Ten years later the walls of the choir and side aisles were finished, and the piers of the dome to the same height as the latter; while in 1710 the highest stone of the lantern was laid by the architect's son in his presence.

The reason for which Wren raised his cupola to its present height when he would have chosen to make it lower is given in the *Parentalia* as follows:—"The old church having had before a very 'lofty spire of timber and lead, the world expected that the new work should not in this respect fall 'short of the old (though that was but a spit, and this a mountain). He was, therefore, obliged to 'comply with the humour of the age (though not with ancient example, as neither did Bramante), 'and to raise another structure over the first cupola, and this was a cone of brick so built as to 'support a stone lantern of an elegant figure, and ending in ornaments of copper gilt;" and again: "The age had been so used to steeples that these round designs were hardly digested unless raised to 'a remarkable height" [*Parentalia*, fo. 1750, p. 291].

Of the inner dome Wren's biographer says:—"The Pantheon within is no higher than its 'diameter, S. Peter's two diameters. This shows too high, the other too low. The surveyor at 'S. Paul's took a mean proportion, which shows its concave every way" [*Parentalia*, ditto].

Since its completion there has been no serious failure in the dome. Soon after Wren's death, the foundations giving way slightly caused the piers to sink and cracks to appear. But these were quickly made up, and since then no constructional alteration or restoration has been necessary.

CONSTRUCTION.—The dome of S. Paul's is a complete contrast to the four others already described, and yet it borrows something from all. Its octagonal plan may be found in Brunelleschi's cupola, and parallels to its inner dome in the Pantheon and S. Sophia; while its external outline is not unlike S. Peter's, and its peristyle much the same.

The central feature is a square [Illustrn. xxiii.], with massive piers at its angles, in each of which is a cavity, that in the south-western pier being used as a staircase. But the dome itself stands upon eight piers, from which spring as many arches; the four cardinal points of the octagon being crossed by semi-circular arches reaching nearly to the level of the cornice below the Whispering Gallery, the other four being lower and carrying a wall above, as in the two smaller pointed arches at S. Maria-del-Fiore. The tambour springs directly above these arches, not, as at S. Peter's, with a huge mass of brick-work some 8½ mètres in thickness, but in two separate walls with a cavity between. Nor is the whole width of the supporting arch covered as at S. Peter's, the external wall rising from about the centre of the extrados. Above this point the following is a general scheme of the structure. Springing from the backs of the four large arches the dome is converted into the circle, but without any form of pendentives, which Sir Christopher Wren entirely distrusted. Above the arches runs the celebrated

* Sepia drawings of the Cathedral, as first designed by Wren (founded on this model), were made by the late Mr. E. C. Sayer, who presented them to the Institute; some are now hanging on a wall of the staircase, and others are in the Library.

Whispering Gallery. Here the diameter of the circle is 112 feet, but immediately begins to contract as the drum is carried up internally in the form of a truncated cone to the cornice at the foot of the inner dome. This inner vault forms no part of the necessary construction, and is merely for internal appearance, terminating in an eye admitting light to the cone above. The cone forms the chief element of strength in the dome. It springs from the extrados of the inner vault, and carries the lantern, a load to which it would be fully equal were the inner and outer domes taken away. While these are the provisions for internal appearance and constructional strength, the external effect of the dome is the most admirable feature of the church. Its beautiful outline is obtained by an outer dome springing above an attic which surmounts the peristyle, and seems to all appearance to carry the lantern which with its ball and cross crowns the whole [Illustrns. xxiv., xxv.].

The materials used in the dome are so much adapted to the constructional fitness of its different parts, that they will best be described more minutely as each feature is considered—suffice it to say here that the stone used throughout is from the whit-bed in the island of Portland, and that in the inner dome and the straight cone brick is the chief material employed. The external vault is entirely a timber construction of oak, coated internally with fireproof paint.

The transition from the octagon to the round is cleverly managed without the aid of pendentives. Instead of rising on a line with the internal face of the arches, the raking tambour is set back, allowing room for a gallery between the wall-line below and its own face, so that the circle, instead of projecting beyond the corners of the octagon, is at every point within the wall.

The sloping tambour is pierced with a series of twenty-four windows, which light the dome, and a thickness of three feet is maintained to the cornice, above which the inner dome rises. The sloping line of the outer wall-face is carried up beyond this to the level of the stone gallery above the peristyle, from which point it is built perpendicularly as the attic wall; and the greater thickness of solid masonry thus created between the internal vault curving inwards, and the outer face carried upwards, forms a foundation and abutment for both the vault and the straight cone. Between the attic wall and the cone a passage runs round the dome. Having got thus far up the structure, it will be better to return to the great arches, and trace that part of the dome which forms the outer elevation of the tambour; and show in what way, connected with the inner wall, it affords abutment to the various parts.

Constructionally, the outer part of the tambour consists of a series of thirty-two buttresses, carried up from above the great arches to a little more than half the distance between the springings of the inner vault and the brick cone. These buttresses, increasing in width proportionally as the inner truncated cone slopes away from the perpendicular line, are divided into two stages. The lower reaches to the level of the windows round the tambour, and forms a podium for the peristyle or upper stage. The buttresses are connected to one another by the external circular wall, or podium, and this to the internal wall by the floors of two galleries, the one at the level of the Whispering Gallery, the other some ten feet below the level of the windows. The buttresses in their second stage consist for the most part of single Corinthian columns. Of these there are twenty-four, while the remaining eight are composed of columns coupled by masonry containing niches. All are joined to the wall of the dome by arches, which carry walls to the height of the cornice of the entablature. Further bond between each buttress and the tambour is obtained by two iron ties, the lower just above the arches, and the second bedded at one end in the entablature and at the other in the masonry of the inner dome. This brings us to the vault itself.

At the level of the passage round the foot of the attic the cone springs from the haunch of the inner vault. Up to that passage the wall is solid above the springing of the vault, which curves inwards to the open eye, with a thickness of 18-inch brickwork. Every five feet it has a course of "excellent brick" 18 inches long, banding through the whole thickness. The eye is 20 feet in diameter. The vault was built upon a scaffold fixed upon the cornice, and had no need of scaffolding below. "This machine was an original of its kind," and "every storey of the scaffolding being circular, and the "ends of all the ledgers meeting as so many rings and truly wrought, it supported itself" [*Parentalia*].

From the solid haunch of the inner dome springs the cone, as before stated. As soon as this is clear of the vault it begins to narrow rapidly at an angle of 66°. It is, in the main, of 18-inch brickwork, and at the height of 266 feet above the pavement, or 50 feet above the inner dome; it is finished with a vaulted covering built in stone and pierced with an eye at the foot of the lantern. In the straight

section of the cone are four girdles of stone, which form binding courses all round the circle 18 inches in depth, and each containing a chain run with lead. Within the curve of the vault are also two chains—one at its foot, and the second at the point where the lateral thrust is greatest—by which the curve is so strongly tied that, with the straight cone below, it forms an immovable substructure on which to build the lantern.

Round the eye, whose diameter is 12 feet, rise the walls of the lantern. These are arranged in an octagon, and are domed over to a central eye at a height of 36 feet from the lantern base. At the foot of the domelet, which is raised upon an attic, are strong tie-beams, into which are framed uprights to carry the supports of the ball. Into them also are fixed the lower ends of the ties which anchor the ball and cross, and the upper ends of those ties which fasten the whole roof to the stonework of the lantern. While the inner wall of the lantern springs round the eye, the platform upon which the peristyle is built rests upon two other walls—the inner pierced with arches, and directly under the columns; the outer resting upon the vault of the cone, which is increased in thickness to receive it. From this outer circle the corbels project which carry the cornice of the platform. All three walls are tied together at various points by iron ties, and iron ties and struts fix them to the cone.

The outer vault, with the exception of the buttresses on which its timbers rest, is of no consequence in the equilibrium of the dome. The principle of construction in the attic is the same as that of the peristyle below. It is a circular wall connected to the cone by a series of buttresses, and upon the top of each of these buttresses stands one of the series of framed supports to the dome. Each of these carries one of the curved ribs of the vault, between which horizontal timbers run all round the circle to carry the covering of ribbed lead—for which one John Roberts, in 1708, estimated a sum of £2,500, as against £3,050, which was the estimate for covering the dome with copper. Inside, the dome is a perfect forest of timbers, by which it is supported from the buttresses and cone; within and upon these rest vertical supports carrying cross-beams, which butt against the cone and the vault, and are supported by struts. There are no openings in this outer dome except those at its crown, immediately under the lantern, which admit light among the timbers.

The ascent is commenced by a broad and easy circular stair in the centre of the south-west pier, at the junction of the aisle and transept, by which the Whispering Gallery is reached. A spiral stair is carried up through the tambour to the "stone gallery" above the peristyle, from which a few steps lead up to the passage inside the attics, and thence the lantern is reached by iron ladders up the cone.

The inner dome is lighted by 24 windows in the tambour, divided by Corinthian pilasters, and with niches between every three, corresponding to those between the columns of the peristyle. Through the eye the light admitted by these openings penetrates to the cone, in whose wall there are three tiers of oval apertures, not counting the larger ones at the foot. In its vaulted summit there are again eight windows, and through all these various openings a certain amount of light finds its way into the outer dome, while through the last-mentioned the top of the cone is lighted from the outside by means of the unglazed openings at the crown of the outer vault. Thus the chief medium of light is found, as at the Duomo of Florence and S. Peter's, in the drum—an arrangement neither so striking as the single light of the Pantheon, nor the windows round the dome of S. Sophia, both of which are, however, precluded by the construction of the dome of St. Paul's.

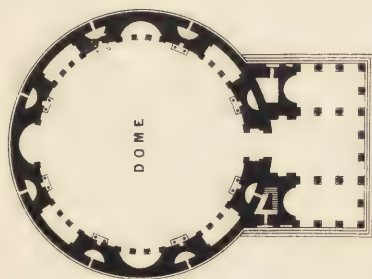
The stability of S. Paul's is so amply assured that it would seem as if its collapse, except under extraordinary circumstances, would be impossible. Sir Christopher Wren took S. Peter's as a warning against miscalculation in the ability of a dome to bear an imposed load, and therefore, instead of placing his lantern upon the curve of a vault, made use of the strongest possible section—that of a straight cone.

Although Wren, as has been said, always maintained that a dome should stand without the aid of ties, he has more than amply provided against the spreading of his cone. At its base there is, of course, the thrust of the inner dome to be taken into account, and therefore two thrusts have to be counteracted at that point. But, granted that sufficient abutment and tie is obtained at this point, the weight of the lantern and cone adds immensely to the stability of the inner dome just at the most critical point of its curve. This abutment is supplied by the thickness of the wall, the buttresses of the peristyle, and the steadying weight of the attic buttresses, to say nothing of that of the outer dome.

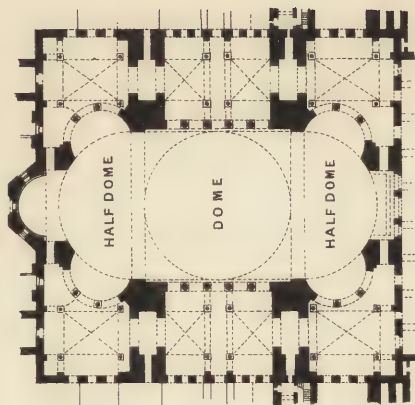
The necessary or, according to the architect, unnecessary tie spoken of above consists of two large chains encircling the dome. The first of these is the larger, placed just outside the direction in which the pressure of the cone is exerted, and just below its springing. It is a large double chain, set in channels run with lead, its two members being connected every ten feet of its length. This encircles the whole dome, and holds it together at the point of greatest thrust, and, placed as it is near the outside of the wall, it comprehends in its course the whole of the fabric at that level. The second is similar, but not quite so large, and is placed behind the cornice of the attic, thus binding all together at the highest point of the abutment, and exerting its pressure through the buttresses against the side of the cone; while running round inside the architrave of the peristyle is another chain tied into the tambour through each buttress. But, not contented with this, Wren inserted, as has been said, six chains in the cone itself, and tied the lantern firmly to the cone, so that the whole structure above the great chain is one solid mass firmly knit together.

PERCY SCOTT WORTHINGTON.

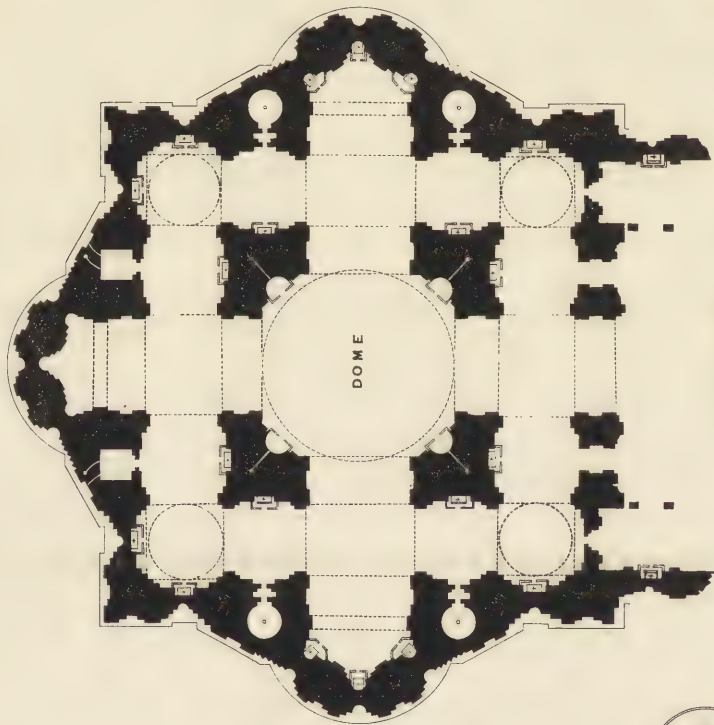
PLANS TO A UNIFORM SCALE.



THE PANTHEON, ROME.

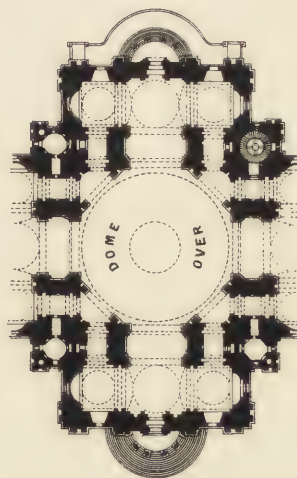


ST SOPHIA, CONSTANTINOPLE.

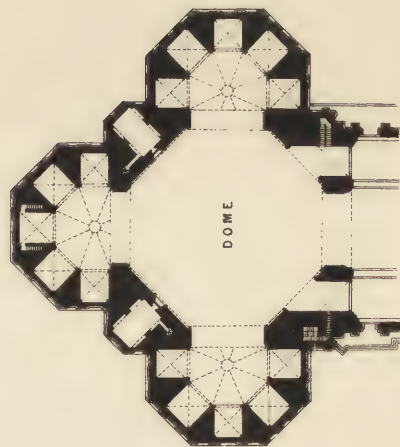


ST PETER, ROME.

N.B. This Plan, as reduced, is to a slightly smaller scale than the others.



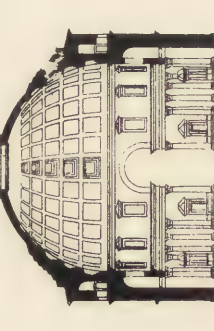
ST PAUL, LONDON.



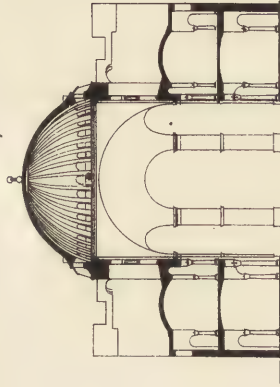
THE DUOMO, FLORENCE.



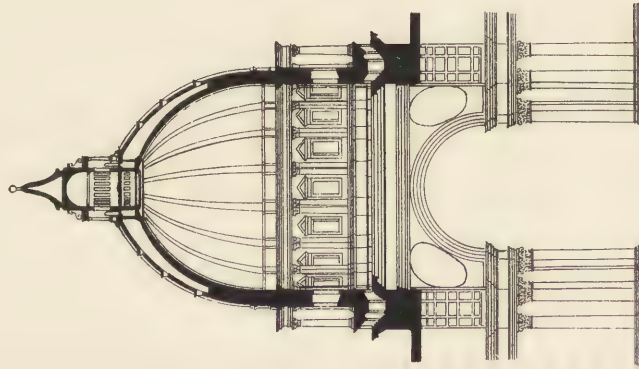




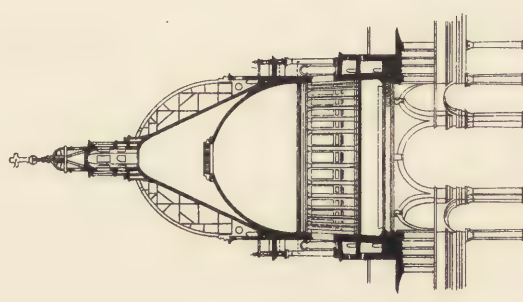
THE PANTHEON, ROME.



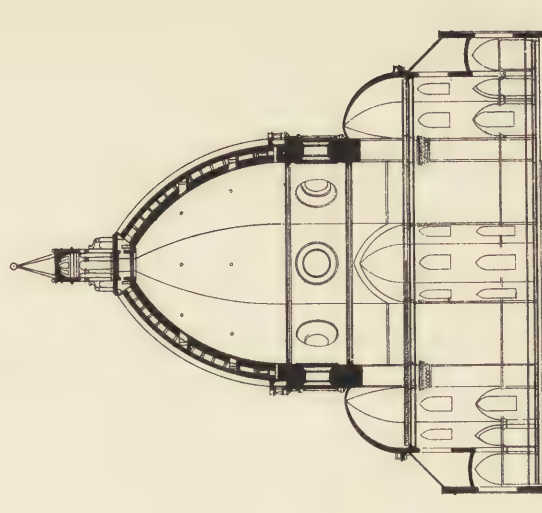
ST SOPHIA, CONSTANTINOPLE.



ST PETER, ROME.

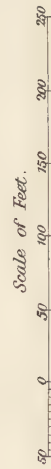


ST PAUL, LONDON.



THE DUOMO, FLORENCE

SKETCH SECTIONS TO A UNIFORM SCALE.







ST. PETER, ROME.



ST. PAUL LONDON.



THE DUOMO, FLORENCE.



THE PANTHEON, ROME.



ST. SOPHIA, CONSTANTINOPLE.



LXIV.

THE LATE MR. STREET'S CONTRIBUTIONS TO THE
INSTITUTE.

- (1) SOME CHURCHES OF LE-PUY-EN-VELAY AND AUVERGNE; (2) THE CHURCH OF ST. MICHAEL-PENKEVEL, CORNWALL; (3) ENGLISH WOODWORK IN THE XIII. AND XIV. CENTURIES; and (4) SOME OF THE DIFFERENCES OF STYLE IN OLD BUILDINGS.

THE following Papers,* which were read before the Institute, the earliest nearly thirty, and the most recent twenty years ago, speak for themselves and need little explanation. There is much in them which had the merit of novelty when it was written, but has been repeated so often since that their interest must be in a great measure historical. Even now, however, the Papers will be accepted as containing a large body of facts, gathered with infinite care and industry, arranged clearly and logically, and made to produce a plentiful harvest of sound deductions. Their suggestiveness has not lost its value, and if the facts themselves are generally known, the method of the student may still be worth noting. The four Papers touch each other at various points, and the convictions of their writer, which are always prominent, give them a unity which justifies their being printed together and regarded as a connected series. The kaleidoscope of the world of Architecture, and of the Church to which so much of Mr. Street's work was devoted, changes so rapidly that some of the opinions expressed may seem hardly worth stating, while criticisms of things which were scotched and killed

* Following the precedents of recent years, these Papers by the late George Edmund Street, R.A., *President*, which have been long out of print, are re-issued for the benefit of the large majority of members who do not possess early volumes of the *TRANSACTIONS*; and to render them still more interesting as a memento of their distinguished author his portrait, reproduced from a photograph taken a short time before his death, forms the frontispiece of the present volume. Moreover, in the case of one Paper, four of the illustrations are almost exact reproductions of Mr. Street's original sketches, lent for the purpose by his son, who, at the request of the Council, has edited the Papers.

before the days of the younger among us will be unintelligible; but they were often so bound up with the subject proper of the Paper as to be difficult of elimination, and they serve a good purpose in throwing into relief the personality of the writer. What revision there has been has not dealt with the actual opinions expressed; they are always Mr. Street's, and in his own words.—A. E. STREET.

[1.]

SOME CHURCHES OF LE-PUY-EN-VELAY AND AUVERGNE.

[The late Mr. George Godwin, *Vice-President*, occupied the Chair.]

MR. VICE-PRESIDENT AND GENTLEMEN,—

IN the course of last autumn,* after having spent three weeks in climbing Swiss mountains, I was able to devote a few days, on my way home, to a district which, as far as I had been able to gather from books, appeared to contain a mine of interest for the architect, not less than for the geologist and the lover of natural scenery. From Lyon I went by Monistrol to Le-Puy, which was the grand object of my tour; thence by Brioude into Auvergne, and through Issoire, Clermont-Ferrand, and Nevers, to Bourges and Paris. I was so much struck by what I saw, that, though I am well aware that my visit was too hurried to be at all exhaustive, I think I cannot do better than give you the results of my journey, in the trust that what was full of interest, novelty, and instruction for myself, may be of some use also to others who have not yet been able to make this journey for themselves. The complete-Gothic architecture of Velay and Auvergne is not, it is true, to be compared to the best work in the north of France. I am not, however, going to tell you about it, but about an earlier style, which, as I hope to show, has special value as illustrating, among other things, the way in which French Gothic was developed from Romanesque and Byzantine buildings; and our attention will, therefore, be almost entirely devoted to buildings which are either Romanesque or Romano-Byzantine in their character, or belonging to the period of transition from those styles to First-Pointed. The complete-Gothic buildings are comparatively few, and have no special value; and I shall, probably, not have time now to refer to them even in the most cursory manner.

I will begin with Le-Puy, the ancient capital of Velay. The city is crowded up the side of a volcanic rock, one end of which is crowned by the picturesque mass of its Eastern-looking cathedral. It consists of a network of narrow streets not passable by carriages, and reminds one forcibly of some such city as Genoa. Above the rock on which the cathedral is perched rises another, called the Corneille, on which are

* The autumn of 1860. The original Paper, which has undergone considerable revision since it was read on 7th January 1861, will be found in the First Series of TRANSACTIONS, 1860-61, pp. 97-119.

some old fortifications, and which has just been crowned by a monstrous image of the Blessed Virgin, made of the metal of guns taken at Sebastopol, and to whose charge I may fairly lay much of the imperfection of my account of the buildings beneath her feet: for I had the ill-luck to arrive at Le-Puy only three days before the inauguration of this statue, and I found the whole city so entirely occupied with preparations for the fête, that it was with the greatest difficulty that I examined the cathedral at all, and into some portions of it I was quite unable to penetrate; whilst the only condition on which I could obtain rooms at an inn was that I should not stop for more than two days, and should make room for some Bishop, Prince, or Cardinal (of whom there were a legion on the road), before the great fête-day. I had to work very hard, therefore, to do as much as I did, and I make no doubt that a more leisurely and uninterrupted examination would have enabled me to discover and do much more. Separated from the great volcanic rock I have already mentioned by one or two furlongs only, is the smaller, but even more striking rock, called the "Aiguille de Saint-Michel," and crowned with a little chapel dedicated to that Archangel. It rises, in the most abrupt and precipitous manner, to a height of about 265 feet. The distant background includes a series of truncated conical hills, evidently ancient volcanoes, and from almost every point of view a landscape of the most picturesque and extensive description is seen. Rarely have I enjoyed a more charming ride than that which, for the last twenty miles into Le-Puy on the road from Saint-Étienne, made me generally acquainted with the remarkable physical formation of this mountain district; beautiful throughout, it was at its best just when, some twelve or fifteen miles before I reached the city, I first saw the "angelic" church, as it is styled, standing up boldly on its rock, the centre of an almost matchless landscape [Illustn. xxvi.].

The story of its claim to this style of "angelic" is this. Bishop Evodius, at the end of the sixth century, on being made first Bishop of Le-Puy, wished to construct a church; the Virgin, who had before shown to St. George the place where she wished one to be built, appeared to a sick woman on the Mount surrounded by a crowd of angels, and desired her to tell Evodius to proceed at once with his work. After much prayer he went to Rome, and the Pope sent back with him an architect and senator named Scutarius, under whose auspices the church was soon built, and whose tombstone is still to be seen near the transept door. Evodius and Scutarius then started for Rome again, but on the way met two old men, who gave them two boxes of relics, and desired them to return to Le-Puy, saying that as soon as they arrived with the relics before the church the doors would open, the bells would ring of themselves, the whole interior would be bright with torches and candles, and they should hear divine melodies, and smell the sweet perfume of the heavenly oil which had served for the consecration of the church by the angels. Everything happened just as had been foretold, and Evodius felt it unnecessary again to consecrate his church, which from that time to the present day has been called the "angelic" church. No doubt you all know how curious a parallel to this legend the history of our own Abbey of St.

Peter at Westminster affords.* But, in searching for information about the churches of Auvergne, I came upon a continuation of the Le-Puy legend, to which the Westminster story affords no such parallel. This second legend tells how, when the "seraphic" "basilica" of Le-Puy had been thus dedicated, St. Anne descended from heaven to visit the palace of her daughter. Not content with this human work, she seized the hammer of the master-mason, and, taking wing, descended on the summit of a hill, and, turning towards Auvergne, which to her mind offered no church worthy of the Queen of Heaven, she threw the hammer, saying as she threw it, "On the place "where the hammer falls a church shall rise." The hammer fell on the right bank of the Allier, and immediately there rose from the soil like a flower the church of Les Chases, which was dedicated forthwith to St. Mary.†

Let us now leave legends, and direct our attention to the ground-plan of the cathedral [Illustn. xxvi.]. Its architects have ingeniously contrived to cover the whole of the summit of the rock on which it stands. It consists of a nave with aisles, transepts, a choir, and choir-aisles, and a steeple at the east end of the north choir-aisle. To the south of the cathedral is the modern Bishop's palace, whilst to the north are the cloisters, two grand halls, some ruins, and to the north-east a chapel dedicated to St. John, and other buildings. There are entrances in the east walls of each of the transepts, but these were rather intended, I suppose, for the exit than for the entrance of the people, and the mode in which they were admitted forms one of the most striking features of the whole scheme. I said that the church was built on a rock, and its western face, forming one of the principal streets of the city, is so steep as to consist alternately of steps and inclines, until, at a short distance in advance of the west front, it is changed to an almost interminable flight of steps. The grand west entrance is an open porch, like an enormous crypt, beneath the three western bays of the nave and its aisles, whose walls and piers it reproduces in its plan. The steps‡ formerly rose in a straight line, until they came up in the very centre of the church, in the fifth bay of the nave, and in front of the roof-loft, and of the miracle-working image of the Blessed Virgin, which, brought from the East and given to the

* I give an extract from "La Estoire de Seint Edward le Rei." MS. Bibl., Publ. Cambridge. Ee. iii. 59 :—

"Seint Pere, du ceil claver,
"Va sa iglise dedier,
"Des angeles mut grant partie
"Li funt servise e grant aie.
"Li angele chantent au servise,

"La nuit quant dedient l'iglise :
"Tant ja du ciel lur
"Ke vis est au peschur,
"Ke li solailz e la lune
"Lur clarté tute i preste e dune."

This is the rubric descriptive of the illustration, whilst in the poem itself is the following passage :—

"E cist si tost cum arive
"Entrez est en sun mustur ;
"Li airs devint lusanz e clers,
"N'out en mustur tenegre ne umbre :
"Atant des angres grant nombre,
"Ki s'en venent a sun servise
"A dedier cele iglise
"Tant ja partut odor,

"Ke vis est a cel pescur
"Ke li solailz la lune
"Sa clarté tute preste u dune
"Angles pu cel avaler
"Regarde e puis remunter ;
"Teu joie a, ke li est vis
"Ke raviz est en Parais,
"Pur l'avisiun k'apert."—G. E. S.

† *L'Auvergne au Moyen Age*, by M. Dominique Branche. Clermont-Ferrand, 1842.—G. E. S.

‡ The steps are arranged in successive groups of eleven, with platforms between them.—G. E. S.

church by St. Louis, was, until its destruction in A.D. 1789, the greatest attraction for pilgrims in France.* This singular entrance, and the mode of exit by the eastern doors of the transepts, gave rise to an old saying that "In Notre-Dame-du-Puy one entered by the navel and went out by the ears." Unfortunately, however, the central entrance has been diverted, and after ascending 102 steps, and arriving at the Golden Gate, as it was called, the passage branches right and left—to the left ascending into the cloister, and to the right winding round the south side of the church, until the 135th step lands the weary pilgrim in the south aisle, near the transept.† This, then, is the general scheme of this most singular church. Let me now go on to describe it in detail, beginning with the oldest portion. This comprises the choir, the transepts, and "crossing," and the two easternmost bays of the nave. The choir is completely modernised, and I am unable to say whether any portion of the internal arrangement is old. It presents the peculiarity of a square exterior and a circular interior. This is a not uncommon arrangement in the earliest Italian examples of the apse, and is seen at St. Mark's, Venice, and elsewhere. The arches opening into the choir-aisles are old, and I believe that we may venture to say that the original plan must have been very nearly the same as that of the church of Saint-Martin-d'Ainay, at Lyon, in which the choir-aisles are shorter than the choir, and all are terminated with apses.‡ I shall have other occasion to point out that at a later date the architects of Ainay and of Le-Puy must have been the same. The date of the foundation of Ainay is some time in the ninth century, and it was carried on until the end of the eleventh; but the apse and capitals of the columns of the crossing—for the columns themselves are Roman—cannot, I think, be later than about A.D. 940 to A.D. 1000, which latter would, I think, be the date generally accepted for this portion of the work at Le-Puy. To proceed with my notice. The crossing is surmounted by a quasi-dome, carried up as an octagonal lantern, much of which has been modernised in restorations, whilst much is quite new; though the universality of the raised central lantern in the churches of the district makes it probable that it is, to some extent, a proper restoration.§ The transepts are covered with barrel-vaults, strengthened by transverse ribs of a square section below them; the small apses in their end walls have semi-domes, and the tribunes which cross them are groined with quadripartite vaults without ribs. The whole of the nave is covered in the same way as the crossing, each bay being divided from the next by bold transverse

* As evidence of the popularity of Notre-Dame-du-Puy this may suffice. In Amiens Cathedral, until A.D. 1820, there existed a series of pictures given by the "Confrérie de Notre-Dame du Puy." A similar *confrérie* existed at Limoges.—G. E. S.

† The passage to the right is evidently modern, that to the left looks as though it were ancient, but a protest against the removal of some ancient work, in the course of constructing it, which I have found in the *Bulletin Monumental* [A. de Caumont], seems to show that it is not so.—G. E. S.

‡ Saint-Martin-d'Ainay, at Lyon, is a parallel triapsidal church, with a central dome, and a western tower of unusual and picturesque outline, adorned largely with inlaid tiles and bricks.—G. E. S.

§ At present the exterior of the lantern is covered with a domical roof; but an illustration that I have seen shows it finished with a low-pitched tile roof, and without any of the inlaid mosaic which is now upon it.—G. E. S.

arches, and having a quasi-dome, supported by arches across the angles of each compartment, and all of them, in truth, being not domes, but eight-sided pointed vaults, springing from the octagonal bases thus contrived. There are no pendentives, properly so called, and the construction is, I should say, that of men who desired to erect domes, but had no knowledge whatever of the way in which they were constructed in the East; or—to take a more favourable and, perhaps, juster view—of men who, desiring to give a small building the greatest possible effect of space, to roof it with stone (not knowing anything yet about flying-buttresses), and to light it from a clerestory, actually solved all these points in a successful way. Where this kind of roof was first attempted I am quite unable to say. Certainly the central lantern at Ainay is so identical in character with some of those at Le-Puy, that the same workmen must have executed both; but there seems to be no other example in the same district as Ainay, whereas at Le-Puy, and in Velay and Auvergne, everything is more or less roofed on the same principle. The second portion of the cathedral at Le-Puy consists of the third and fourth bays of the nave, and the third portion of the fifth and sixth bays.*

The latest portion is of Early Pointed character, and not later in date than *circa* A.D. 1180 to 1200, and it was at the same time that this was erected that the greater part of the enormous substructure forming the porch was also completed. The aisles throughout the church are vaulted with quadripartite vaults, the three western bays alone having ribs. In the two western bays there are engaged shafts both in the porch and above it in the nave, but the rest of the piers are of the simplest plan, large and generally cruciform in their section, save at the crossing, where the arches are carried on coupled detached shafts. There is much elaborate sculpture introduced in the capitals of the pilasters and columns of the nave, but it is nowhere of any very high merit, and is so inferior in delicacy and beauty to the sculpture of the same age to be seen on the banks of the Rhône, that I should attribute it to a native school of sculptors acquainted, probably, with none but inferior Roman sculpture, from which they endeavoured to develop a style for themselves. A clerestory of wide and rude round-headed windows, one in each compartment, lights the series of domes in a very effective manner.

The arches across the nave are very bold, and, in the wall above them, an opening is pierced under each of the cupolas. As is generally the case, however, in churches covered in this way, very little is seen of the real vault in any general view of the church, these transverse arches only, with the quasi-pendentives above them, being seen. The pendentives are true semi-domes, constructed in alternate courses of dark and light stone, and the difference between their plan and the square angle in which they are placed is skilfully concealed by detached shafts, with capitals placed under the pendentives.

I think you will agree with me, when you look at my sketch [Illustrn. xxvii.], that considering its early date (no part probably later than *circa* A.D. 1150 or 1180), it

* The division of the building into work done at various epochs is beyond question, though there may be some question as to the dates I assign. On the ground-plan the dates are indicated by the direction of the lines [Illustrn. xxvi.].—G. E. S.

would be difficult to find a grander or more nervous scheme, or one which, with such small dimensions, conveys nevertheless so great an impression of size and importance. The choir-aisles were altered at various times. That on the south has been rebuilt in Second-Pointed of poor character, and is now a mere passage-way to the modern sacristy, and that on the north was probably interfered with not very long after its first construction, when the great steeple which now abuts upon it was commenced. M. Mérimée,* in his very interesting description of the church, suggests that the base of the tower was originally a baptistery, but I see no reason whatever for this suggestion, and it is impossible to doubt, when we carefully examine the whole design, that though the steeple was long in building, the main feature in its design was from the first just what we now see it to be. Moreover, the chapel of Saint-Jean close by is said to have been the baptistery for the whole city until within the last sixty years. The design of the steeple is very bizarre and unusual. It consists of a long series of no less than nine stages on the exterior, and it diminishes rapidly in diameter, and is, perhaps, on the whole, more curious than pleasing in its outline [Illustrn. xxvi.]. If you look at the ground-plan you will see that its construction is most remarkable. The internal diameter of the tower at the base is 24 feet 6 inches, but this is reduced to only 12 feet by four detached piers, 1 foot 10½ inches square. These piers are carried up from the base to the very summit, detached in the three lower stages, and forming part of the thickness of the wall in the portion above. The highest stage of the steeple, 12 feet in internal and 16 feet in external diameter, is therefore, as nearly as possible, carried up on these four piers, and the rapid decrease in the external dimensions, from 36 feet to 16 feet, was only rendered possible by this very ingenious mode of construction. So far as I know there is only one other example of the same scheme, viz. in the steeple of the cathedral of Saint-Étienne at Limoges. Here, however, the base is the only portion remaining of the original work, and the columns are cylindrical in place of being square, but it is evident that the intention was the same as at Le-Puy. The steeple at Limoges is probably the first in point of date. M. Viollet-le-Duc dates it at about A.D. 1050, but the Abbé Arbellot, in a learned paper on the cathedral, in the *Bulletin* of the Société-Archéologique-et-Historique-du-Limousin, maintains that it was certainly built before A.D. 1012, when the Bishop Arnaud de Périgueux, after assisting at the consecration of Bishop Gerald at Poitiers, accompanied him to Limoges, and put the cords of the bells into his hands. The lower part of the steeple at Le-Puy may, I think, safely be referred to the end of the eleventh century, and its completion to the end of the twelfth, whilst the planning appears to me to be thoroughly characteristic of a Byzantine artist, the construction of the piers in the lowest stage being almost identical with that of the main piers under the domes of St. Mark's, Venice, and Saint-Front, Périgueux.

The arrangement of the belfry stage, with its gable on each face, is very noteworthy, and is, perhaps, one of the earliest examples of a type which was

* Mérimée, *Notes d'un Voyage en Auvergne*, p. 226.—G. E. S.

developed afterwards into the well-known arrangement of the belfry of the south-west tower at Chartres, and this, combined with the influence of the churches of the Rhine,* into almost all subsequent modifications of the spire, with its gabled spire-lights; one of the windows under this pediment is planned in a most ingenious manner, presenting externally a semi-dome pierced by two pointed arches; another window is pierced with a trefoil head, the diameter of which is much larger than that of the light it surmounts. This is a favourite form of cusping throughout this district. I have seen it in Lyon, at Vienne, often at Le-Puy, at Brioude, at Notre-Dame-du-Port, Clermont, and in the south porch at Bourges; and there can, I think, be little doubt that it is somewhat eastern in its origin, and analogous to the horseshoe form of arch.

The cloister on the north side of the church appears to be in part coeval with the earliest,† or, perhaps, the second portion of the fabric, and in part with the later additions to it. It consists of a simple arcade of round arches on rather solid piers, with a detached shaft on each face. The capitals are all richly sculptured, some with figures, some with foliage. The spandrels of the arches are filled in with a reticulation of coloured stones; above the arches runs a band of similar ornament, and above this again a carved cornice, which in the later part of the cloister forms a sort of frieze. In this portion the arches have sculptured key-stones, a peculiarity which I hardly remember to have met with before in work of the same date. On the south side there are two fluted shafts and one spiral; all the rest are circular, but noticeable for their very considerable entasis. The groining is all quadripartite without ribs, and executed with rough stones, set in concrete, on a centering of boards. The cloister was surrounded on all sides with buildings. On the south is the cathedral; on the east, and opening to the cloister by an arcade of open arches, is a large hall covered with a pointed barrel-vault. This was originally called the choir of Saint-André, and in it masses in commemoration of the dead were said, and services held on the feasts of the Invention and Exaltation of the Cross, and on the feasts of St. Andrew and St. Eustachius. It was also called "cæmeterium," being used for the burial of the clergy, and is now called the chapel "des Morts." On the end wall are still to be seen remains of a painting of the Crucifixion, with many prophets and angels, St. Mary and St. John, the sun and moon, &c. In the northern gable of this building is a fine cylindrical chimney built in alternate courses of dark and light stone, and rising from a fireplace in a chamber over the hall, and of the same date as the hall. M. Viollet-le-Duc gives a drawing of the fireplace, which is of a not uncommon early type, the head projecting considerably on a semicircular plan. At the north end of the Salle-des-Morts is a passage leading to the cloister, and along the whole northern boundary once stood a vast range of building called the Maîtrise.‡ Nothing now remains of this save its undercroft, which was spanned by bold pointed arches of stone,

* See Viollet-le-Duc [*Dictionnaire*, art. "Clocher," pp. 312-18] for a reference to this influence of the Rhine Churches.

† M. Viollet-le-Duc considers the earliest part of the cloister to date from the 10th century; M. Mérimée thinks the 11th century more likely.—G. E. S.

‡ The "maîtrise" was, I believe, the school attached to the cathedral.—G. E. S.

on which the wooden floor rested. The Maîtrise was pulled down a few years since, and, not long before, a tower close by it, called the tower of Saint-Mayol, was also destroyed. It is described as an erection of the eleventh century, battlemented, but without machicoulis.* It seems to have served as part of the fortification of the church, which was also attended to in an alteration of the building on the west side of the cloister, in the fourteenth century. This building contained below, a hall on a level with the church, which was the chapel of the Holy Relics; above was the Salle-des-États of Velay, with a stone barrel-roof, now both thrown into one room. Above these again was an open space under the roof, protected on the side towards the town by a magnificent overhanging battlement and machicolation of the fourteenth century, and quite open on the side towards the cloister save for the stone piers supporting the roof. The machicoulis are some of the finest I have ever seen, and project from the buttresses as well as from the walls. The only access to this stage of the building seems to have been from the roof of the cathedral. Le-Puy was, in the first instance, selected as a site for the cathedral because it afforded so secure a refuge from attack, and in later days it seems to have been not less necessary to provide against danger: for among other enemies the Lords of Polignac, whose magnificent castle is visible from the steeple of the cathedral, only some four miles distant, were the most conspicuous as they were also the most powerful. M. Viollet-le-Duc supposes, indeed, that the tower of the cathedral was meant in part for defence; but I see no evidence of this, and possibly he had in his mind the destroyed tower of Saint-Mayol, which, as well as the double wall of *enceinte* which formerly surrounded the whole cathedral, was no doubt a purely military construction. Fortified churches are by no means uncommon in this part of France. At Brioude is a painting showing the church entirely surrounded by a crenellated and turreted wall in A.D. 1636; and Royat, near Clermont, and the abbey-church of Menat, also in Auvergne, still retain provisions for defence. The Salle-des-États contained formerly the archives of Velay, and in removing them a few years since (about A.D. 1850) portions of a hanging of blue wool, “*semée*” with fleurs-de-lys, and adorned with the armorial bearings of Jean de Bourbon, Bishop of Le-Puy from A.D. 1443 to 1485, were found.† At the same time a curious painting on the east wall of the lower chamber was discovered under the whitewash. It represents four liberal sciences—Grammar, Logic, Rhetoric, and Music—as females seated with ancient worthies at their feet. Priscian sits below Grammar, writing; and two boys, with open books, are on her other side. Logic holds a lizard in one hand and a scorpion in the other, and Aristotle is arguing below. The inscription underneath is—“*Me sine doctores frustrâ coluere sorores,*” and each figure has a corresponding

* Mérimée, *Notes d'un Voyage en Auvergne*, p. 232.—G. E. S.

† It is very difficult to understand precisely where these hangings were found. M. Aymard, a distinguished antiquary at Le-Puy, in the *Album Photographique d'Archéologie Religieuse*, speaks of the painting on the wall of the Salle-des-États, and then, in another place, says that the tapestries given by Jean de Bourbon served to decorate the Salle-des-États of Velay, and after the regrettable destruction of that hall the remains of them were preserved part in the cathedral and part in the museum. Possibly he refers to the removal of the floor below the Salle-des-États, for the hall itself has not been destroyed.—G. E. S.

leonine verse inscribed below. Rhetoric holds a file in her left hand, and Cicero sits at her feet. Music plays an organ, whilst Tubal, with two hammers, plays upon an anvil. There used—according to the "*Chronique de Médecis*"—to be a second painting here with figures of young demoiselles gorgeously clothed, and from the same chronicle it appears that Messire Pierre Odin, official of the Bishop Jean de Bourbon, who died in 1502, presented both :—" Il estait si grant orateur que, par son mellifère et suaviloquent langage, fust commis plusieurs fois estre ambassadeur devers le Pape à la requette "de très-excellent et redouté Prince Louis XI. roy de France, lequel dudit Pape obtint "grande louange et avoir, ce que il employa en divers façons et moyens en aulmosnes "et à la décoration de cette saincte église du Puy." The picture has considerable merit; its detail is a mixture of Renaissance and Gothic, and the Gothic portion—as, for instance, the chair on which one of the figures sits—is not Italian, and I should be inclined to suppose that it was the work, therefore, of a French artist. Its date must be between 1475 and 1502. Louis XI. came to Le-Puy on a pilgrimage in 1475.

The external side elevation of the church is best seen from the cloister, and, with a few words upon this, I will leave this portion of the building. Here, even more clearly than inside, the division of the building into work of different epochs is seen. The two bays nearest the crossing have large coupled windows in the aisle, with parti-coloured voussoirs and jamb shafts. The clerestory is very peculiar in its treatment, and undoubtedly very effective; the windows are of one light in each bay and round-headed, and on each side of them above the springing there is a recess in the wall, in the centre of which a detached shaft is placed to carry the cornice. A similar recess and a smaller shaft occur immediately over the arch of the window, and the window-arch being built of alternately dark and light stone, and all the sunk panels being filled in with geometrical patterns, composed in the same way, an extremely rich effect is obtained. Recesses of the same kind in the upper part of the walls occur all along the eastern face of the transept at Le-Puy; and between the clerestory windows of Notre-Dame-du-Port, Clermont; Saint-Paul, Issoire; and commonly in Auvergne. But, as far as I can judge from the portion of the cathedral in which they occur, and from the early and simple character of the work itself, I am inclined to believe that it is earlier here than in any of the other examples. It would be of great interest to have some more positive evidence on this and other similar questions of date. But, so far as I have been able to discover, there is no such evidence, and we are left in doubt, therefore, whether this portion of the architecture of Velay came from Auvergne, or whether the reverse was the case; as also whether this external decoration of the fabric is coeval with its first erection, or is a subsequent addition.

The two central compartments of the nave have circular windows (16 feet in diameter) to light the aisle, and round-headed windows in the clerestory; and between the arches of the latter windows are small arched recesses. In the two western bays the clerestory is similar, save that the intermediate recessed arch is omitted. In both the voussoirs are counter-changed, and the wall from the springing up to the eaves is coursed with stone and lava. The transept gables are only noticeable for the courses

of inlaid patterns with which they are enriched. All these patterns are formed with white stone and lava. The latter, indeed, forms the whole ground of the walls, and varies in colour from a greenish grey to black; and the patterns are formed with the darkest lava and stone. The cloister is similarly inlaid above the arches, but it has almost all been restored in a most injudicious manner. They have *struck* and *ruled* (I believe that is the technical phrase for this most abominable of inventions, is it not?) an enormous red mortar joint between all the stones,* and wherever this has been done the diaper appears to be formed with a chequer of black and red; wherever the cloister has not been retouched the diaper is black and white.

I have left, almost until the last, that which is after all the crowning wonder of this singular church—the western porch. I have already referred to its position and plan. The majesty, I may say the awfulness, of this entrance, can hardly be exaggerated. It owes little to delicate detail or enrichment of any kind, for, though these have been, they are no longer; but it is the gloom and darkness, the simple, nervous forms of arch and pier, the long flight of steps lost in obscurity and crowded constantly (when I saw them) with a throng of worshippers, which constitute the strange charm of this strangest of entrances. I told you that in the nave the two western bays of the aisle alone had groining ribs; in the porch below it is only in the western bay that they are used, and this affords interesting evidence of the very gradual yet regular development of our art.

The spaces below the aisles in the third bay from the west form chapels—that on the right dedicated to Saint-Martin, and that on the left to Saint-Gilles. Before the last extension of the building these chapels were at the extreme west end. They have western doorways, which still retain the wooden doors. Each of these doors was of four divisions in height, covered with subjects carved in low relief. They are executed either in cedar or oak (I am uncertain which, for they are covered with paint), and the subjects, inscriptions, and borders are all obtained simply by sinking the ground 3-16ths of an inch. The figures are, of course, only in outline, but it is still evident that they were carefully painted with draperies, &c., so as to be thoroughly distinct. There is some appearance of the ground having been painted with broad horizontal bands of colour, but the traces are so indistinct that it is difficult to speak positively.† The doors are hung folding, and those to the chapel of Saint-Gilles contain subjects from the early life of our Lord, whilst those in the chapel of Saint-Martin contain subjects from His Passion. The meeting-rail in the former fortunately contains an inscription of extreme value:—“Gaulfredus : me : fet : “Petrus : epi”; after which some letters are lost. If my reading of the last letter but one as “p” is correct, I think it leads to a most important inference. No one who looks at the design of these gates can doubt that they are thoroughly Eastern in their character; and, upon searching for the lists of Bishops of Le-Puy since my return, I

* M. Mallay, of Clermont, says that the mosaic work of the church of Notre-Dame-du-Port, Clermont, was all set in red mortar originally.—G. E. S.

† See further observations on this subject, page 201.

was delighted to find that the first Bishop of the name of Peter * was consecrated at Ravenna by Leo IX. in A.D. 1043, and died at Genoa A.D. 1053, as he returned from the Holy Land. Gates of the same description are said to exist in the churches of Chamaillères and of Lavoulte-Chilhac in the same district, whilst other evidence of intercourse with the East is afforded by fragments of *tissus* preserved at Monestier, at Pébrac, and at Lavoulte-Chilhac. These *tissus* are all extremely Eastern in their character, and very similar to the famous cope at Chinon described by M. de Caumont in the *Abécédaire*, and to the Le-Mans *tissu* described by M. Hucher in the *Bulletin Monumental* (1846, p. 24). The date ordinarily attributed to them is the middle of the eleventh century, which exactly tallies with the return of Bishop Peter from the Holy Land. I dwell on this the more because, if the inference I have drawn from the inscription be true, it gives the date also to the second portion of the construction of the cathedral, to which the chapels in the porch undoubtedly belong; and the result would be that whilst I should date the earliest portion of the church at about the end of the tenth century, or quite the commencement of the eleventh, the second portion would be dated at about A.D. 1050; and, finally, there is little doubt as to the whole having been completed in the course of the twelfth century.† These dates are, as in all such cases, of course only approximate; and it is pretty clear that there was seldom any long pause in the works, and the development in their architectural features is therefore very gradual.

The external elevation in the west front is similar in style to the clerestory on the north side, and mainly executed in alternate courses of lava and stone. The aisle-roofs are masked by walls with pediments. Throughout this part of the work you will observe that its early date is proved by the fact that the round arch is almost invariably used for ornament, and the pointed arch only where great strength was required. A great buttress, which had been built against this west front, was removed during the recent restorations.

I observed before that there are doorways on the east side of both transepts—the “ears” referred to in the old saying. The south transept door is in itself remarkable for the peculiar form of the cusping of its arch, and still more for the magnificent porch built over it. The date of this is the latter part of the twelfth century. It is open on the south and east sides, and abuts on the church on the west and north, occupying the re-entering angle between the transept and choir aisle. The arch is remarkable for a rib detached below the arch, and connected at intervals with it by columns, so as to have the appearance of being suspended. My impression is that the architect feared that his arch had not sufficient abutment, and hoped by bringing some of the weight on to the lower rim of the arch to remedy this defect. The whole detail of this porch is a very rich kind of Pointed, full of half-Romanesque and half-Byzantine detail. The groining, in alternate coloured courses, is quadripartite, but

* The predecessor in the See, Stephen II., uncle of Bishop Peter I., was buried at Lavoulte-Chilhac.—G. E. S.

† A diploma of A.D. 1146 is dated from the “Ville d’Anis” (*i.e.* Le-Puy), and fixes the date at which this “cité” received the name of “ville.”—G. E. S.

has the very rare feature (in France) of ridge ribs. Above the porch is a room or chapel, to which I omitted to gain access. Over the door of the other (north) transept a great arch, thrown from the cathedral to the chapel of Saint-Jean, carries another chapel, lighted with a First-Pointed triplet. This door is square-headed, and covered with rich though rude ironwork. The door-handles have a resemblance to one in the cathedral at Trèves made by Jean and Nicholas of Bingen, which struck me, and was remarked on also, I find, by M. Mérimée. The lintel of the door is deeper at the centre than at the sides of the door, pediment-like, and has figures of our Lord and the Twelve Apostles carved on it, whilst above, under a circular arch, is another figure of our Lord, with an angel on either side. The whole has been very much mutilated and all the figures are hacked to pieces. The ground was painted, and no doubt the figures were also, and the woodwork of the door was covered with linen or leather under the ironwork.

The very ancient chapel of Saint-Jean is close to this door, and by its side is a fifteenth-century archway. The chapel is arcaded on its south side and pierced with very simple windows. Some antiquaries assert that it is a piece of Roman construction, and it is not impossible, though I should be much more inclined to call it tenth-century work. The chapel has a rude quadripartite vault, and its apsidal chancel is roofed with a semi-dome.

I must conclude my long notice of this church by some mention of the extensive remains of painted decorations still visible. During the late restorations of the cathedral I understand from M. Aymard that the greater portion were destroyed. The vaults of the north transept and the semi-domes of its apsidal recesses are still, however, covered with paintings, though they are scarcely intelligible, owing to darkness and dirt. In one of them occurs a figure of our Lord giving the benediction in the Greek fashion, and it is one of the many evidences which may be adduced of the Eastern influence visible here in so many respects, though I am not disposed to lay so much stress upon it as some of those did who engaged in the controversy it occasioned.* In the western porch there are also extensive remains of painting; the soffits of the arches in the third bay from the west are all painted, and so too are the walls over the altars in the chapels of Saint-Martin and Saint-Gilles. The painting was executed on a thick coat of plaster, and the nimbi are of gold with lines incised on them. No doubt the whole church once glittered with gold and colour, and, seeing how fine its effect still is, we may, aiding the indications still left with our recollections of Assisi, of Venice, and of Padua, people the bare walls once again, and bring before our eyes an interior of the most gorgeous magnificence.

* See M. Aymard's *Album Photographique d'Archéologie Religieuse*, and a communication from the same gentleman in the *Bulletin Archéol.* vol. ii. p. 645. M. Aymard mentions one other example, a diptych, figured in Montfaucon (*L'Antiquité expliquée*), vol. iii. p. 89, which dates from about A.D. 900. The hand at Le-Puy is larger than life, and has a double nimbus round it, the inner yellow, the outer dark red; the hand is white, and the ground within the nimbus dark blue. The Secretary of the Comité-Historique-des-Arts-et-Monuments considers that this representation of the Greek mode of giving the benediction makes it certain that the work at Le-Puy is Byzantine in its origin. But one may, I think, be allowed to doubt whether this conclusion is to be absolutely depended on.—G. E. S.

I may conclude what I have to say about the cathedral with a few words about the Sacristy and its contents. The building itself is not more than 150 years old, and most of its treasures have been lost. The most precious relic still left is a Bible, which, by a note at its end, is stated to have been written by St. Théodulf, Bishop of Orléans, in the ninth century, and sent by him, in accomplishment of a vow, to the shrine of Notre-Dame-du-Puy. It is a 4to. of 347 leaves of very fine vellum, some white with black letters, and others purple or violet with gold or silver letters. It contains the Old and New Testament, commentaries on the text, interpretations of Hebrew, Greek, and Latin words, and some poems by Théodulf. The pages are interleaved with excessively delicate tissues of various colours and patterns, which appear to be of the same age as the book, and of Eastern manufacture. They are made of china crape, cotton, silk, linen, poil-de-chèvre, and camel's hair, of extreme fineness, and of various colours and patterns.* The binding is, however, later, and of red velvet on chamfered oak boards, with good simple metal knobs. There are also preserved here some wax candles, tapering considerably in their length, and stamped with a pattern made by a pointed instrument; and, finally, there is a tippet embroidered with a tree of Jesse, said to have been of Charlemagne's time. It is not so old as is said, but may possibly be (though I very much doubt it) of the twelfth or thirteenth century, but it has been much damaged by removal from its original ground and by partial re-working. The Sacristy also contains a reliquary of very late sixteenth-century date, of which a photograph has been published by M. Aymard, but which was not shown to me; and an almost endless roll of vellum illuminated with a chronological tree of the history of the world.

How much has been lost may be guessed from some statistics which I have come upon as to the number of silversmiths and specimens of their work in Le-Puy in the Middle Ages: in A.D. 1408 there were no less than forty resident in the city, whilst as to their work I find that in A.D. 1444 there were in the sacristy 33 chasses and reliquaries, 26 chalices, 11 statues of the Blessed Virgin Mary, angels, and other figures, 10 candelabra, 9 crosses, 9 lamps, 9 mitres, crosses with their stems, episcopal rings, crowns for the Virgin, censers, paxes, basins, plates, books with covers adorned with chasings, pearls and precious stones, and many like things; and in A.D. 1475 I find that Louis XI. gave 30 silver marks for a canopy over the miracle-working figure of Notre-Dame-du-Puy, which was made by François Gimbert, a silversmith of Le-Puy. Other churches in the neighbourhood have been more fortunate in retaining some of their old plate, and a fair list might be made out, if I had time, of their possessions, many of which have been photographed by M. Aymard.

The building of the greatest interest, after the cathedral, is the little church of Saint-Michel, which crowns the rock fitly called the Aiguille [Illustrns. xxviii., xxix.]. It is reached by steps winding irregularly round the rock, to the shape of the summit of which it has been most ingeniously adapted. The oldest portion of the building is the

* M. Aymard.—G. E. S. [See footnote on preceding page.]

square choir, covered with a dome, under which stands the principal altar. To the (ritual) east and north of this are apsidal projections, and to the south an archway, which, as it agrees exactly in dimensions with the others, opened, no doubt, into a third apsidal chapel, like the others, whilst the entrance was at the west. This archway now leads into a chapel of very irregular form, part of which extends over the porch of entrance, in the arrangement of which one may trace a certain kind of analogy to that of the cathedral, though it is perhaps older. West of the choir is a nave, somewhat like a cone in plan, and surrounded by an aisle, from which it is divided by arches supported on slender shafts. The choir has a square domical vault, and the chapel over the porch a true dome, the pendentives under which are just like those of Santa-Fosca at Torcello. The apsidal chapels have semi-domes, and the rest of the church has a waggon-vault of very irregular outline. An arcade against the walls of the aisle corresponds with that between the aisle and the nave. At the end of the nave is the tower, which was probably built at a slightly later date than the main building. The whole interior appears to have been richly painted, but faint indications only of this portion of the decoration remain. In the central dome there is a sitting figure of our Lord on the east side; emblems of the Evangelists are at the angles, and angels and seraphim around our Lord. Below these is a line of single figures, six on each side—the four-and-twenty Elders—and below this again are subjects, the whole combining together to make a very interesting example of the treatment of the Last Judgment. The dome of the chapel over the porch is also painted with our Lord, Angels, and the Evangelists.

The walls generally are built of lava, though a little white stone is used in the steeple and for the sculptured capitals.

The columns are very small, averaging 8 inches in diameter, and decrease considerably in diameter from the base to the capital. The dimensions are exceedingly small, the central choir being only 13 feet 6 inches in diameter, and the spaces between the principal columns in the nave varying from 4 feet to 4 feet 9 inches. The effect is rather that of a crypt, but, in spite of its small size, it is solemn and religious.

The steeple suggests comparison, in some respects, with that of the cathedral; the arches are built with alternately light and dark voussoirs, and there is a peculiar spire-light rising out of the parapet, as to the antiquity of which I have my doubts.*

The only part in which any rich decoration has been introduced is the front of the porch [Illustn. xxviii.]. It has a semicircular arch, trefoiled above a horizontal lintel. The walls are richly inlaid, and there is also a good deal of sculpture. In the centre division of the trefoiled tympanum is an *Agnus Dei*, and there are figures kneeling and holding chalices within the cusps on either side. In the five divisions of the arcaded cornice are—in the centre our Lord, on his right St. Mary and St. John, and on his left St. Michael and St. Peter. The mosaic is executed with black tufa, red and white

* The spire lights in the cathedral steeple are very similar, and the same form is seen again in the steeple of the church of Sainte-Marie-des-Chases, in Auvergne.—G. E. S.

tiles, and a light yellow sandstone. I know no other example in this district of the use of tiles for inlaying, though M. Mallay mentions one at Merdogne in Auvergne, which he says is of the seventh century, though his dates are not always to be implicitly trusted; but at Lyon, in the extremely beautiful Romanesque domestic building called the Manécanterie, and at a slightly later date in the church of Ainay, in the same city, they are freely used and with admirable effect. Odo de Gisse, in his history of Le-Puy, published in A.D. 1619, states that the first stone of Saint-Michel was laid in A.D. 965, and that the church was completed in A.D. 984, when Guy II. was Bishop of Le-Puy, "as one may learn from the ancient charter of its foundation, and from other "manuscripts which I have read." Brother Théodore, in his *Histoire de l'Église Angélique de Notre Dame du Puy*, A.D. 1693, says that the first stone was laid in August 962, and that his statements are "derived from the deed for the foundation of "the church, and from the book of obits in the cathedral." These dates, if they refer to the existing building, can only do so to the central portion with its apses; the nave may have been added some time in the eleventh century, and the steeple, perhaps, in the course of the twelfth.

At the foot of the flight of steps which leads up to the picturesque entrance of this little chapel are the remains of a small detached building, probably a residence for a sacristan or priest.

Very near the Aiguille of Saint-Michel is a curious chapel. It is an octagon, with an apse projecting from the eastern face, the octagon covered with an octagonal domical vault, and the apse with a semi-dome. The walls are arcaded inside and out below the vault, the internal arches springing from engaged shafts in the angles. Some of the arches outside are cusped in the usual way, the cusping not starting from the cap with a quarter-circle, but with a half-circle, the same as all the rest. There are doors in the west and north sides, with tympana filled in with mosaic, and the wall in the spandrels between the arches outside is also inlaid. The exterior of the apse is not visible, but I found, on making my way into the cottage and barn built against it, that it is perfect and undamaged. The popular opinion at Le-Puy is that this chapel is an ancient temple of Diana, a fiction which a minute's examination destroys. M. Didron maintains that it was a mortuary chapel, and he refers to the Chapel of Sainte-Croix, at Montmajour, as an example akin to this. M. Mérimée, on the other hand, says that the Templars had property in the Faubourg-de-l'Aiguille, and compares it to the similar oratory of the Templars at Metz, and he might have added the curious Templars' church at Laon as another case in point.

This concludes my notice of early buildings in Le-Puy, and I have no more than time to catalogue the Church of Saint-Laurent, famous for the monument of the Constable Duguesclin, a large Second-Pointed building of poor character, and very Italian in its plan and design,* and with an enormous sham front; the gable end of

* The elevation of one bay of the nave of this church is almost exactly the same as that of San-Petronio, Bologna, though of course on a very reduced scale. The plan is Italian also, the nave groining-compartments

the hospital chapel, with its fifteenth-century bell-turret; a pretty little fountain, and a large number of picturesque houses of the fifteenth and sixteenth centuries; and a very scanty remnant of a gateway at the bottom of the town, called, I think, the *Porte-de-Panessac*, against the proposed destruction of which I find M. Aymard protesting only a few years back in the *Bulletin Monumental*.

About four miles to the north of Le-Puy, close to the ruins of the magnificent Castle of Polignac, is the Romanesque church of the village. This is parallel-triapsidal in plan, and the piers are planned, as are those in the cathedral, in the shape of a cross, with columns in the re-entering angles. The little church at Monistrol is a good example of the Le-Puy type applied to a very small building; and the church at Le-Monestier, which has many features of similarity to the cathedral at Le-Puy, and is rich in early plate, ought not to be forgotten, but I am unable to speak of it from personal inspection.

I will now turn to the churches of Auvergne. Though numerous, they are so much alike in their character, details, and design, that a description of their peculiarities need not be so long as might be supposed. These churches all lie in a group together, Clermont-Ferrand being their geographical centre,* and to its north are Riom, Volvic, Menat, Mozat, and Ennezat; to the east Chauriat; to the west Royat and Orcival; and to the south Saint-Nectaire, Saint-Saturnin, and Issoire.

Beyond the bounds of the province, at Brioude, at Conques, at Toulouse, and in the Church of Saint-Étienne at Nevers, there are, among many others, examples of precisely the same description of design and construction.†

It will be well to describe the general type of these churches, and then give a few notes as to particular examples. In plan they consist of a nave and aisles, western narthex and steeple, central dome and steeple, transepts with apsidal chapels on the east, and apsidal choirs with the aisles continued round them, and four or five apsidal chapels round the aisle. Under the choir is sometimes a crypt, in which, in addition to the columns under the columns of the apse, are four shafts which were intended

being square, whilst those of the aisles are very oblong; the contrary arrangement is, as I need hardly say, almost invariable in Northern Gothic plans.—G. E. S.

* The Cathedral of Clermont-Ferrand, a fine fourteenth-century church, is said to have been originally on the same plan as Notre-Dame-du-Port; excavations have proved this to have been the case. The present cathedral is almost precisely similar in plan to those of Narbonne and Limoges (see Viollet-le-Duc, *Dictionnaire*), and is said to have been commenced in A.D. 1248 by Bp. Hugues de la Tour.—G. E. S.

† I give a list of some of the churches which either belong to or illustrate the Auvergnat type, with their dates, as nearly as I can ascertain them:—Conques, completed by A.D. 1060. Saint-Étienne, Nevers, commenced A.D. 1063, consecrated A.D. 1097. Saint-Eutrope, Saintes, consecrated in A.D. 1096. Saint-Genes, A.D. 1016—A.D. 1120. Saint-Front, Périgueux, A.D. 984 to A.D. 1047. Angoulême, A.D. 1109—1136. Fontevrault, A.D. 1100. Saint-Hilaire, Poitiers, A.D. 1049; Moustier-neuf, ditto, A.D. 1069—1096; Sainte-Radigonde, ditto, A.D. 1099. Riom (Saint-Amable), A.D. 1077—1120. Saint-Sernin, Toulouse, *circa* A.D. 1150. Cluny, commenced A.D. 1089; consecrated A.D. 1131. Dorat (Hte. Vienne) and Bénévent (Creuse), *circa* A.D. 1150—1200. Saint-Germain-des-Prés, Paris, consecrated A.D. 1163. Le-Moutier (suburb of Thiers), A.D. 1016. Saint-Saturnin. Volvic. Issoire. Saint-Nectaire. N.-D.-du-Port, Clermont, *circa* A.D. 1080—1160. Brioude, *circa* A.D. 1200. Orcival.—G. E. S.

for the support of the altar, and whose presence certainly seems to suggest that it must have been a baldachin and not merely an altar that they were designed to support.*

The naves are roofed with waggon-vaults, either with or without cross ribs below them. The aisles have quadripartite vaults without ribs, and the triforia above them are roofed with a continuous half barrel-vault, which resists the thrust of the vault of the nave, and is, in truth, a continuous flying-buttress. The triforia galleries are lighted with small windows, and this, the only light analogous to a clerestory, being entirely inadequate, the effect of the nave roof is generally very gloomy. The transepts are vaulted with barrel-vaults like the nave, and in one or two instances are divided in height by a sort of tribune level with the triforium. At Brioude, where this arrangement is seen, there is an original thirteenth-century open fireplace in the tribune, and M. Mérimée ingeniously suggests that the noble canons of Brioude—for they all had the rank of Count—were in the habit of hearing mass before a good fire; but it is fair to them to say that the fireplace is in the east wall, and that I saw no signs of an altar near it. The "crossing" under the tower is generally roofed either with an octagonal vault or with a circular dome with an opening in the centre. To resist the thrust of this dome on the north and south sides the upper vaults of the triforia are continued on between the transepts and the crossing, or else vaults of the same section are introduced at a higher level, where the central dome is raised (as it often is) higher than the barrel-roof of the nave. The western steeple, as well as the centre lantern, was sometimes domed; and that at Brioude is a most valuable example of the best type of dome in the district. The choirs are vaulted with waggon-vaults terminating with semi-domes, and the apsidal chapels are also each covered with a semi-dome [Illustn. xxx.]. The columns are generally square, with half-columns engaged on three, and sometimes on four sides, the latter only when the main vault of the nave has transverse ribs below it. The columns round the apse are circular, and detached shafts against the apse walls carry the groining, and occasionally shafts are introduced inside and outside the window-jambs of the choir. In the nave and triforia, the windows are generally very plain with a label containing a billet-moulding, though the latter have sometimes, as at Notre-Dame-du-Port and Issoire, jamb-shafts. The capitals of the columns are carved with great richness, sometimes with foliage, but often with Scripture subjects. At Saint-Nectaire, for instance, perhaps the most elaborate of all these churches in this respect (M. Didron is my authority), the capitals round the apse have subjects from the New Testament, four on each capital. Frequently griffins and other animals are carved, and in one case, at Brioude, is a demon holding an open book on which is written the sculptor's name, which does not seem to

* St. Gregory of Tours (*Hist. Francorum*) says that in A.D. 440 a church was erected in Clermont by the Bp. Namacius, 150 feet in length, 60 feet wide, and 50 feet high from the seat of the Bishop to the vault; a circular gallery surrounded the choir, and on each side were two aisles elegantly constructed. The church was in the form of a cross, had 42 windows, 70 columns, and 8 doors; its walls were adorned with mosaics of various marbles [quoted by M. Branche, *L'Auvergne au Moyen Age*].—G. E. S.

be a very complimentary arrangement. It is in the earlier examples that sculpture of subjects and figures is commonly seen, and, as the style developed more towards Gothic, foliage took the place of subjects. The arcades are remarkable for their generally lofty proportions. They are of course not so lofty as pointed arcades, but they have seldom, if ever, the heavy and low proportion commonly found in the arcades of Romanesque buildings. The arches are generally semicircular, and in the apses stilted.

The walls were probably covered with paintings of Scripture subjects. At Brioude there is some of this decoration remaining in a chapel dedicated to St. Michael, in the gallery over the narthex. The semi-domes of the apsidal chapels in this church were also richly painted, and in one of them traces of colour exist all over the window-jambs. At Notre-Dame-du-Port, Clermont, in cleaning the nave, after removing seven or eight coats of whitewash, considerable traces were found of gilding on the capitals, and if this portion of the church was thus highly decorated, there can be no doubt that the colouring of the choir was at least equally sumptuous.

A stone seat is in some cases continued all round the walls of the apse and its chapels inside and out, and in one or two cases the iron grilles still remain. The only instance of the old pavement that I saw was at Brioude, where it is composed of black and white stone in chequers; but this is a mere fragment and of poor design.

The entrances to the crypts are by stairs from the transepts or "crossing." The staircases to the upper portion of the building are variously placed. At Notre-Dame-du-Port they are in the middle of the north end of the aisles; at Brioude, in the transepts, and also at the west end; and in this church, an enormous wooden stair leads from the south door up to the chapel of Saint-Michel over the narthex.

On the exterior the designs are as much alike as in the interior. The aisle-walls are divided into bays by pilasters, above which arches are turned over the aisle windows, and then above are the windows lighting the triforia, which are generally more richly decorated than those below, and form part of an arcade with carved capitals and moulded bases. The walls are finished by a boldly-projecting cornice supported on large corbels. The transepts are buttressed at the angles, have a heavy engaged column in the centre, from which two arches spring, within which are pierced two windows; above these are other windows—either two or three lights—and the gable is either filled in with mosaic or pierced with more windows. It is on the exterior of the apse that the main effort at display is made, and the more ornate examples of the style, as Notre-Dame-du-Port, Issoire, and Brioude, are singularly rich in their effect. The two former examples are of very nearly the same date (about A.D. 1080 to A.D. 1130); the latter is considerably later (probably *circa* A.D. 1200). I will describe Notre-Dame-du-Port first. Here the transept-chapels are much lower than those of the chancel, and the latter (four in number) have cornices below the cornice of the aisle, and gable walls are raised on the aisle walls to receive their roofs, which would otherwise run back to the clerestory. There are windows between each of the chapels, and a great part of the beauty of the effect, both internally and externally, is to be attributed to this fact. I am not sure that the whole arrangement is not a

modification of the original plan, for on close examination I found that the labels of the large windows between the chapels are returned and mitre with another label against which the chapels are built, and which might very well have formed part of an arcade pierced at intervals with windows. In the neighbourhood, about half-way between Clermont and Issoire, at Saint-Saturnin, there is a church precisely similar to what this would have been without its chapels, and the eccentric position of the chapels at Notre-Dame-du-Port, there being none opposite the centre,* would be just such as would have been rendered necessary if it had been desired to add them after the work had progressed somewhat towards completion. In any case, however, there could not have been any great interval of time between them, and probably the chapels and the clerestory are of exactly the same age. The whole of this apse is full of beautifully inlaid patterns, made with red and black scoriæ and white stone. The enrichment is always confined to the walls above the springing of the windows, and does not generally extend quite to the cornice. The spaces between the corbels under the cornice are inlaid, and the under side of the cornice is carved with a sunk pattern and in some cases appeared to me to have been coloured. Between the clerestory windows is precisely the same arrangement of shafts supporting a flat lintel under the cornice that I described in the first portion of the clerestory of Le-Puy, and here, as there, the recessed wall is all inlaid.

At Issoire the general scheme is precisely similar. Here, however, a square chapel juts out from the centre of the apse, and the question arises whether this is an original arrangement. The suggestion I should throw out here, as at Clermont, would be that this is the only original chapel, and that the others were added just as those at that place may have been. In both these churches the buttresses are alternately rectangular and circular, and the latter are always finished with carved capitals.

Saint-Julien, at Brioude, is an example of a later date, but it adheres closely to the same type, save that there are five apsidal chapels; and though the windows are much more elaborate, having jamb-shafts and moulded arches, and being arranged in a regular arcade of triplets in the clerestory, there is much less positive effect of decoration owing to the comparatively small amount of inlaying.

The churches at Brioude and Issoire are both on a much larger scale and generally finer than Notre-Dame-du-Port.

Lastly, I come to the steeples of these churches. Of these there were generally one or two at the west end, and one over the crossing. I believe that not one of those over the narthex now remains, though two or three have been recently rebuilt. Those at the crossing were treated in a singular manner. The eastern wall of the transept, carried up much above the height of the walls of the apse, forms an enormous mass for the support of the steeple, and is arcaded and pierced with windows, or inlaid. The steeples seem generally to have been octagonal, and to have consisted of two stages

* Saint-Hilaire at Poitiers and Angoulême Cathedral have only four chapels.—G. E. S.

arcaded and sometimes shafted at the angles, and capped with stone spires sloping at an angle of about 60 deg. The steeple at Issoire is quite modern, and I believe no authority existed for it. That of Notre-Dame-du-Port is also new, the finish having been a bulbous slated erection, with an open lantern at the top, only a few years ago. Ancient examples, more or less perfect, still exist at Saint-Saturnin, Ennezat, Orcival, and Saint-Nectaire, and all of these are octagonal. These churches tally with most other early churches in this feature of central steeples.

I have not yet mentioned the roofs. In those which I was able to examine, they are covered with slabs of stone, supported from the stone roofs without any use of timber whatever. The ridges are also of stone, elaborately carved, and the whole construction seems to be as imperishable in its scheme as anything I know of the kind.

The churches of the Auvergnat type present so little variety, and were built within so short a space of time, that a description of each of them in succession would be wearisome. Of course there are some variations. Saint-Amable at Riom, for instance, has the main arches pointed, whilst the triforium arcade is round-arched, and the vault of the nave is also pointed instead of round. The vault of the nave of Issoire is another example of a pointed vault. At Saint-Nectaire the usual piers in the nave have given way to columns. At Brioude, the style reached its perfection, and, indeed, I know few effects more striking in every way than that of the aisles round the choir; the roof, constructed as a regular barrel-vault and without any ribs, seems to be true in principle, and to carry the eye on even more agreeably than our ordinary Gothic vaulting of circular aisles, in which the eye is often distracted by numbers of conflicting lines of ribs. The wall arcades between the chapels recall the peculiar form of trefoil to which I have before had to refer, and it is again met in the triforium of the south side of Notre-Dame-du-Port.

The doorways appear to be of two kinds; one enriched with sculpture, the other with inlaid work. Of the former the south door of Notre-Dame-du-Port is a fine example. The opening is square, covered with a pediment-like lintel, on which are sculptured in low relief the Adoration of the Magi, the Presentation in the Temple, and the Baptism of our Lord. Above the lintel is a round arch, under which is a figure of our Lord, seated with a seraph on either side. Against the wall, below the lintel on each side of the door, are figures of Isaiah and St. John the Baptist. In the much-altered church at Mozat,* near Riom, is a door of a somewhat similar kind, and both are very like the doorway in the north transept of Le-Puy. At Saint-Nectaire is an example of a door with the tympanum filled in with mosaic.

The masonry is usually of wrought stones squared, but not very neatly put together. M. Mallay, the architect of Clermont, who has restored some of them, ascertained the curious fact that the stone-masons who wrought the stone for the arches, and wherever else superior work was required, marked their stones with the usual

* At Mozat is a magnificent shrine of copper enamelled and at Saint-Nectaire a variety of precious relics—crosses, reliquaries, and the like—of which M. Mérimée has given a list.—G. E. S.

masons' marks, whilst those who wrought the stones for plain walling, jambs, and quoins, made no mark ; and he found that precisely the same masons' marks occurred at Issoire and Notre-Dame-du-Port ; whilst the details and plan of Orcival, a few miles south-west of Clermont, are again so identical with both of these, as to leave little room for doubt that it was executed by the same workmen ; and I found another evidence of the way in which details were repeated, in some fine ironwork on the south door of Brioude, which occurs again at Orcival.

The arches are generally built with small stones of the same size and of even number, so as not to allow of a keystone. M. Mallay says that the mosaic work in the walls of these churches had wide joints of red mortar, projecting from the face of the wall. These mortar joints in the restored work appeared to me to be a bad modern device, and I think that the evidence in their favour ought to be very strong to be convincing.

The proportions of these churches are very similar. At Issoire, the width from centre of aisle wall to centre of nave column is one-fourth of the whole width, equal to the width from centre to centre of nave columns, and to the diameter of the chapels in the apse, and one-half the height of the aisle, and one-fourth that of the nave. The height from floor to ridge is equal to the extreme width at base of walls. At Notre-Dame-du-Port the same kind of proportion exists, but from the outside of the buttress to the outside of the nave pier is one-fourth of the whole width.

I must now, before I conclude, say a few words as to the date of these churches, for which M. Mallay * is inclined to claim rather too great an age. He dates most of them (conjecturally) in the tenth century, though he admits that buildings in which the pointed arch is introduced may be as late as the twelfth century ; and he considers the date of Notre-Dame-du-Port, Clermont, as *circa* A.D. 863 to 868. He founds this belief on the fact that no lava was used in its construction, and that the mosaics in its walls were formed of scorix found on the surface of the soil. He considers that lava was not used until the eleventh century, but he must also prove (which he has not done) that stone was never used in Auvergne after the use of lava had once been admitted. M. Mallay depends no doubt to some extent on the admitted date of the nave of Saint-Amable, at Riom, where the main arches are pointed, in A.D. 1077. But the presence of the pointed arch proves nothing as to date, for we see it long before this in Saint-Front, at Périgueux ; and in every other respect there is no doubt that Saint-Amable presents every evidence of being older than Notre-Dame-du-Port, and others of these churches, in which none but round arches occur.

On either side of Auvergne there are other churches, of precisely the same character as to plan and mode of construction, the dates of which are pretty certain. One is Saint-Étienne, at Nevers, which was commenced in A.D. 1063, and completed and consecrated on 13th December 1097. The plan of this church is similar in nearly every respect to that of the Auvergne churches. But, so far as one may judge of

* See M. Mallay's *Essai sur les Églises Romanes et Romano-Bysantines du département du Puy-de-Dôme*. Moulins, 1838.—G. E. S.

date from style, I should have no hesitation in saying that this church must be older than either Issoire or Notre-Dame-du-Port. It is ruder in character, there is very little sculpture on the capitals, which are mostly a sort of rude imitation of Doric, and in the transepts there are not only round arches, but also some straight-sided.

At Conques, south of Auvergne, is another church on the same plan as Saint-Étienne, Nevers, in almost every respect, which there is little doubt was completed in the first half of the eleventh century, by the founder Abbot Odalric. Then again to the west there is the church of Moustier-neuf, Poitiers, commenced in A.D. 1069, and consecrated in A.D. 1096, which has a *chevet* evidently formed upon the same type as Conques; and at Saint-Hilaire, in the same city, consecrated in A.D. 1069, whilst the ground-plan of the *chevet* is just the same as that of Conques, the nave columns are strengthened by a transverse arch, similar in its purpose to a flying-buttress, and analogous, therefore, to the half barrel-vaults of the triforium in Auvergne. Now none of these churches are earlier than the beginning of the eleventh century, and yet it is hardly credible that a province shut in as Auvergne was, should have received a perfect and complete new style, or invented one, and carried it to the degree of finish and perfection at which it had arrived when Notre-Dame-du-Port was erected, without our being able to trace, somewhere, the source from which it was developed. I believe, however, that its origin may be traced if we examine carefully the architecture of the church of Saint-Front at Périgueux, commenced in A.D. 984 and completed in A.D. 1047. This church, founded on the same type as, if not copied from, St. Mark's, Venice,* exercised a vast direct influence on the architecture of the day. It is seen most clearly in churches which are, like itself, cruciform, without aisles and covered with domes. The churches of Auvergne, and those other examples to which I have referred, seem to me to be clearly derived from Saint-Front, or from the Eastern models on which it too was founded. The east end of St. Mark's presents a circular wall, with a succession of semicircular recesses or apses in its thickness. Santa-Sophia contains the same feature, though differently treated. The Roman circular buildings which have so much in common with Early Byzantine architecture have the same feature; and San-Vitale, Ravenna—whether it is Romanesque or Byzantine in its origin—is planned in a similar way. The architect of Saint-Front evidently copied his apse from these models, only converting the recesses of St. Mark's into chapels projecting from the walls.† The Auvergne architects attempted to combine the plan of the basilica, with its nave and aisles, with the features which were seen at Saint-Front. They retained its external wall and projecting chapels, therefore, but placed within them the cluster of columns round the apse forming an aisle between the chapels and the choir. By this simple and natural modification of the Saint-Front plan to meet the necessities of their triple-aisled churches they at once invented, one may almost say, the perfect French *chevet*. I know no other churches in France of the same age which appear

* St. Mark's, Venice, was commenced in A.D. 977.—G. E. S.

† Plans (to a uniform scale) of St. Mark's, Venice, and of Saint-Front, Périgueux, are given in *TRANSACTIONS*, Vol. IV. N.S., Illustn. xxviii., pp. 172-73.

to have suggested so much in this respect; and you will realise it if you compare their plans with, among others, those of Bourges Cathedral, Saint-Pierre at Bourges, Saint-Martin at Étampes, Chartres Cathedral, the destroyed church of Saint-Martin at Tours, and finally what is, I think, almost the best complete Gothic plan, that of Rouen Cathedral. In every one of these we see the surrounding aisle lighted by windows between the chapels, and the chapels are distinct and well-separated on the exterior, precisely as in these older churches in Auvergne. These buildings, therefore, have great value, not only as illustrating a chapter of the history of our art, but because the chapter which they do illustrate is just one of the most interesting I can conceive; being that which explains how and by what steps Gothic architecture, of which, as our national style, we are so justly proud, was developed from the noble architecture of the old Romans and Greeks—an architecture to which we owe, among other things, this great debt of gratitude, that it naturally led up to, and rendered possible, a Westminster, a Chartres, an Amiens, and all the other glories of our Christian architecture.

You will have gathered that there are many similar features in the churches of the two provinces which I have been describing. They are shortly these: vaults and quasi-domes alike, and carried on the same kind of squinches or pendentives; the decoration with mosaics and its detail; the design and treatment of doors, either sculptured or inlaid; the form of trefoil cusping of arches, character of mouldings, sculpture and decoration with painting, all of these are the same throughout both districts. The only marked difference—and it is important—is in the ground-plan, the cathedral of Le-Puy having no *chevet*, but an east end derived from Romanesque rather than Byzantine precedents; and the other churches in its neighbourhood are generally similar in their plan.

There are two important heads of my subject to be shortly discussed before I conclude. One of them refers to roofing, the other to coloured decoration. First, as to roofing. I have already explained how this was executed; let us now consider why the modes which we see were adopted. At Saint-Front the experiment was tried of covering a nave and transepts with a succession of domes resting on pendentives, and supported on pointed arches spanning the nave. These domes were the only covering of the church, and were visible on the outside as well as on the inside. At Conques, the architect, unable to carry domes on the comparatively delicate piers which were all that were required for the division of a nave from its aisles, contrived a barrel-vault for his nave, the thrust of which was resisted by the half barrel-vault of the triforium; a device not improbably obtained from Byzantine churches: for if we compare the section of Santa-Sophia with that of the crossing and central dome of Notre-Dame-du-Port, we shall find the semi-domes, affording abutments for the great domes in the former, absolutely identical in their section with the half barrel-vault, which forms the abutment on the north and south sides of the central dome of the latter.* But it was impossible to

* Mr. Fergusson gives a section of a church at Granson on the Lake of Neuchâtel, in which the aisles and nave are roofed in the same way as at Conques and in the Auvergne churches. He says that the date of



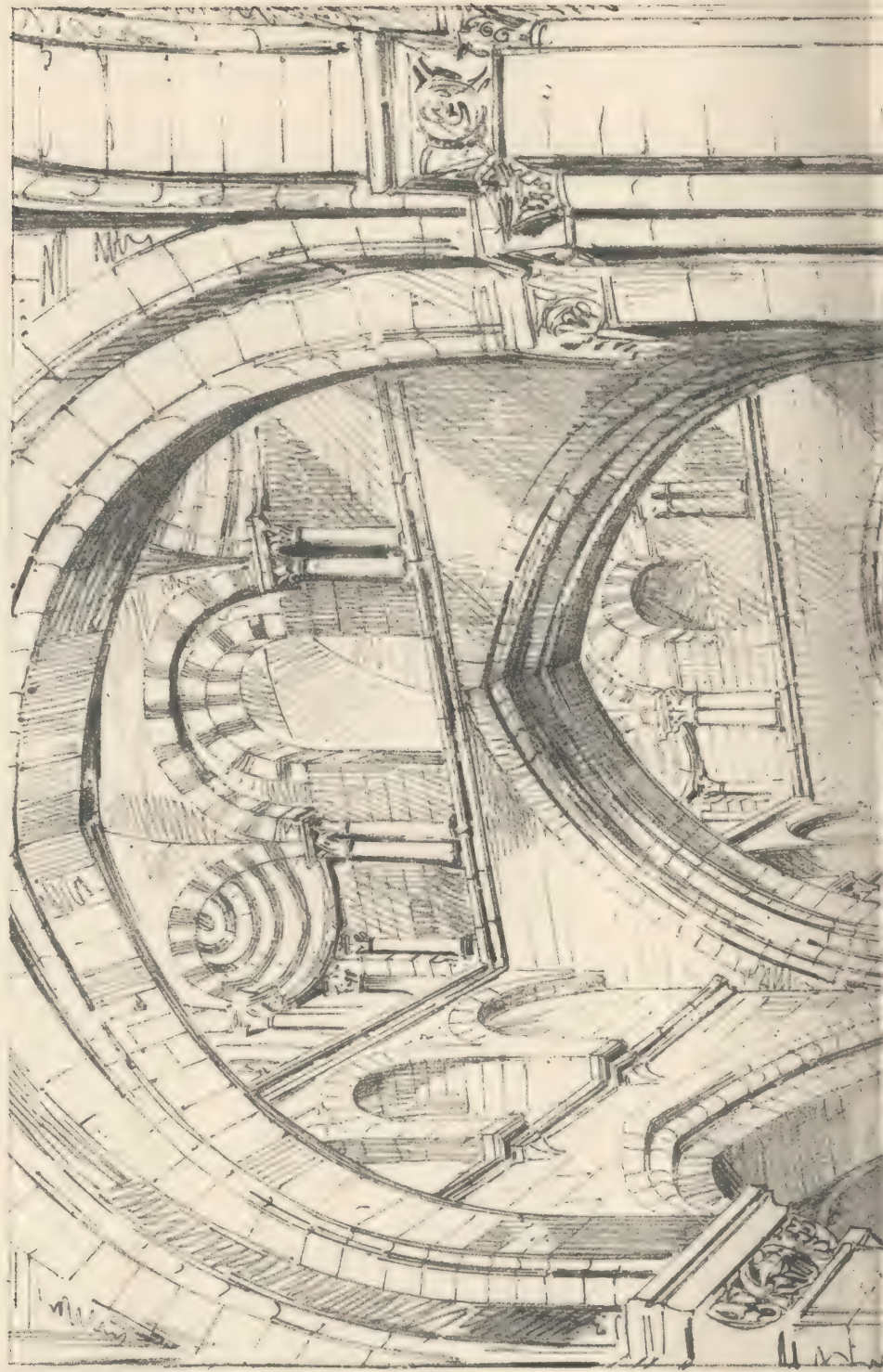
THE CATHEDRAL OF NOTRE-DAME-DU-PUY, FRANCE.

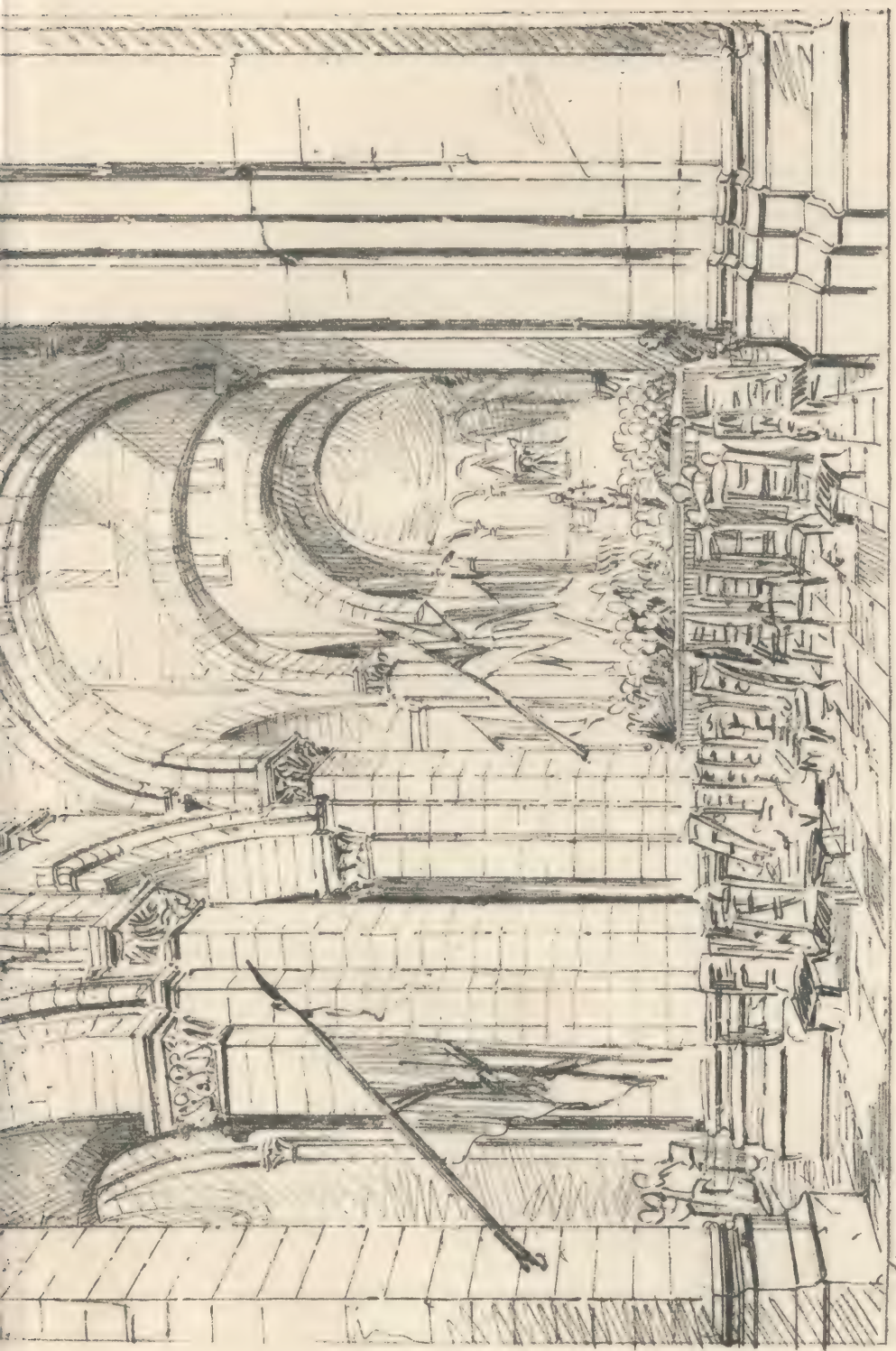
Pages 191,202.





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LXIV. THE LATE MR. STREET'S CONTRIBUTIONS TO THE INSTITUTE (xxvii)





INTERIOR OF THE CATHEDRAL OF NOTRE-DAME-DU-PUY, FRANCE.

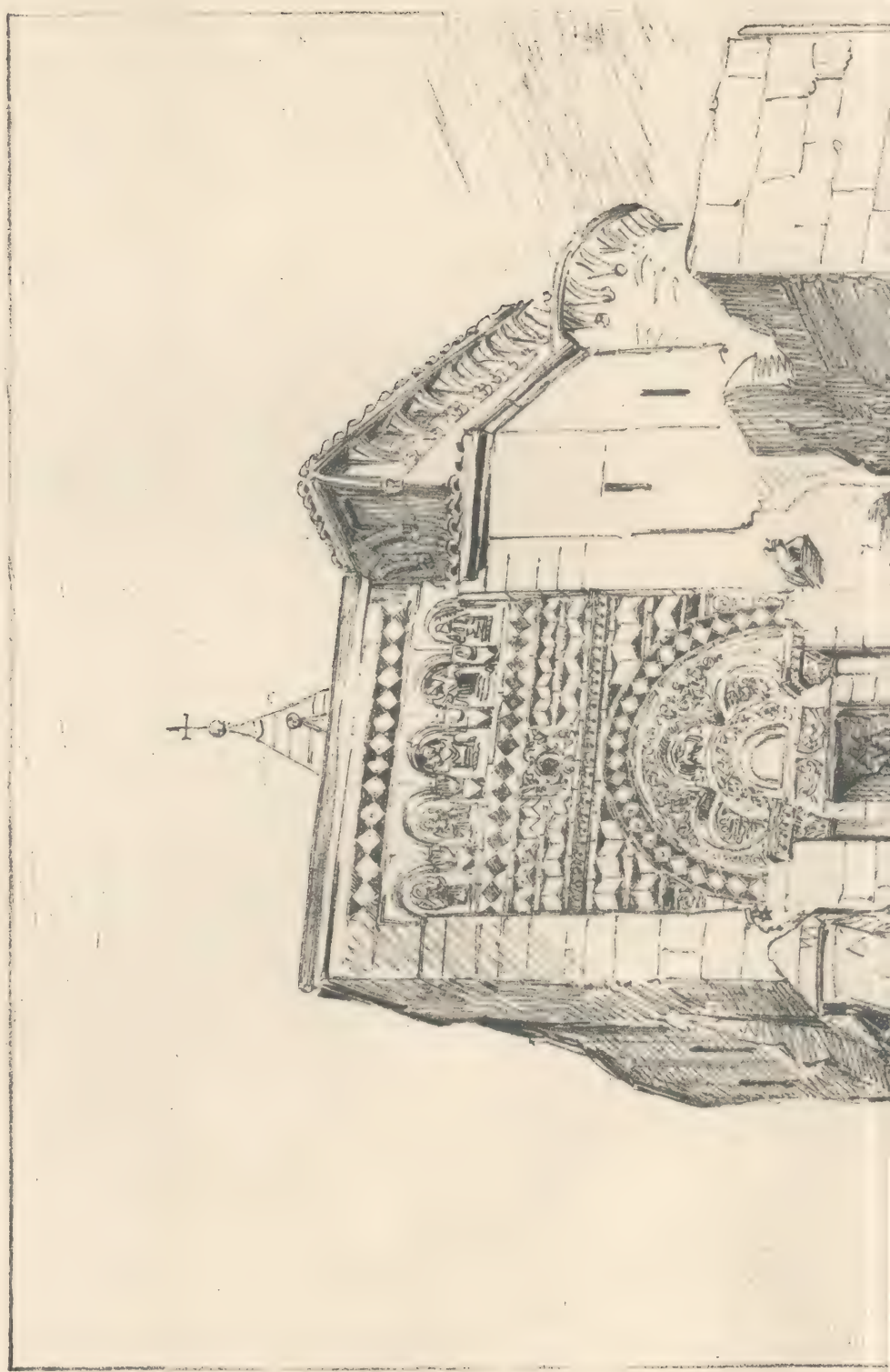
FROM A PENCIL SKETCH BY THE LATE MR STREET, R. A. PRESIDENT.

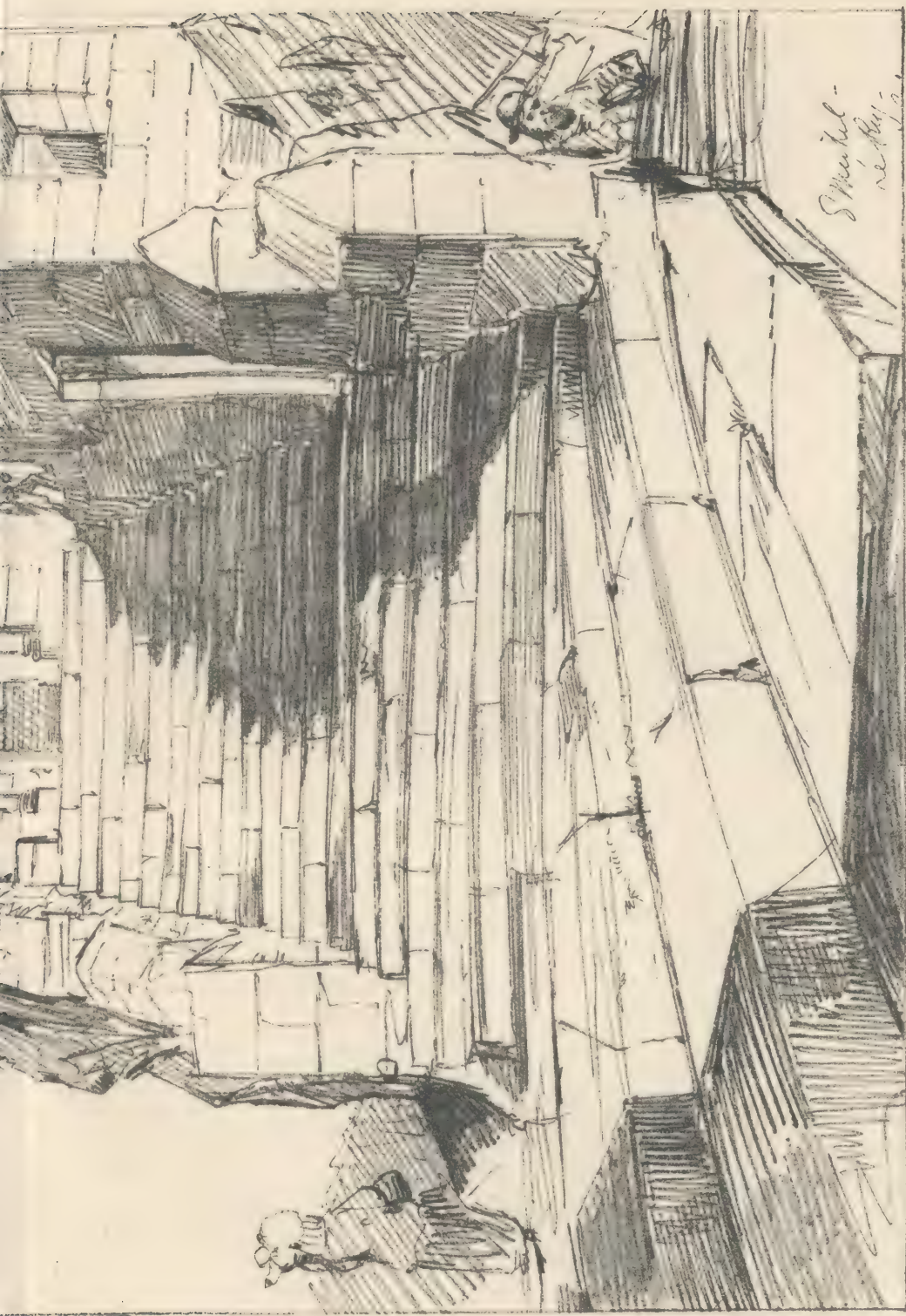
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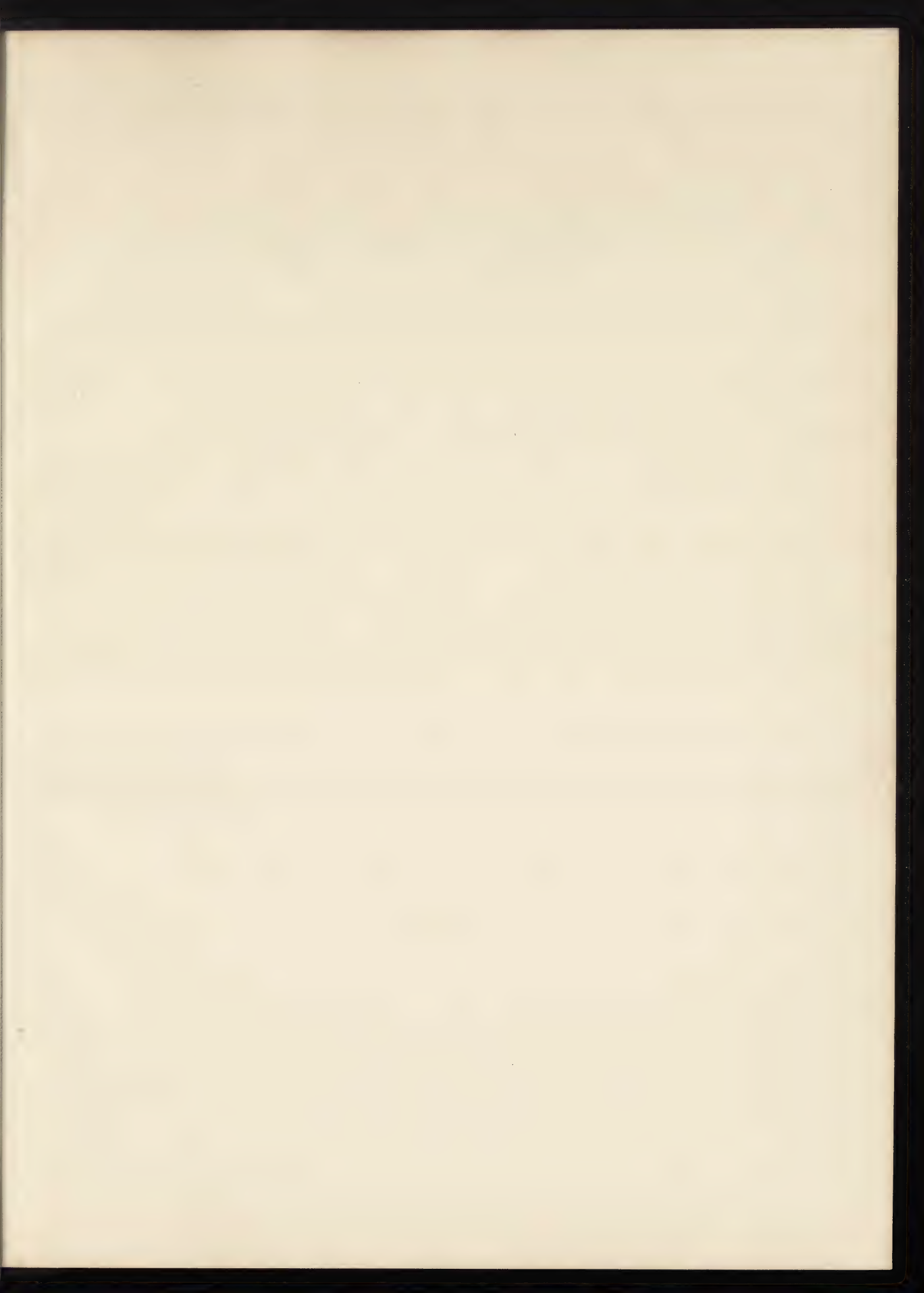


ENTRANCE TO THE CHAPEL OF SAINT-MICHEL, AT THE PUY-EN-VELAY, FRANCE.

FROM A PENCIL SKETCH BY THE LATE MR STREET, R.A. PRESIDENT.

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CHAPEL OF SAINT-MICHEL A
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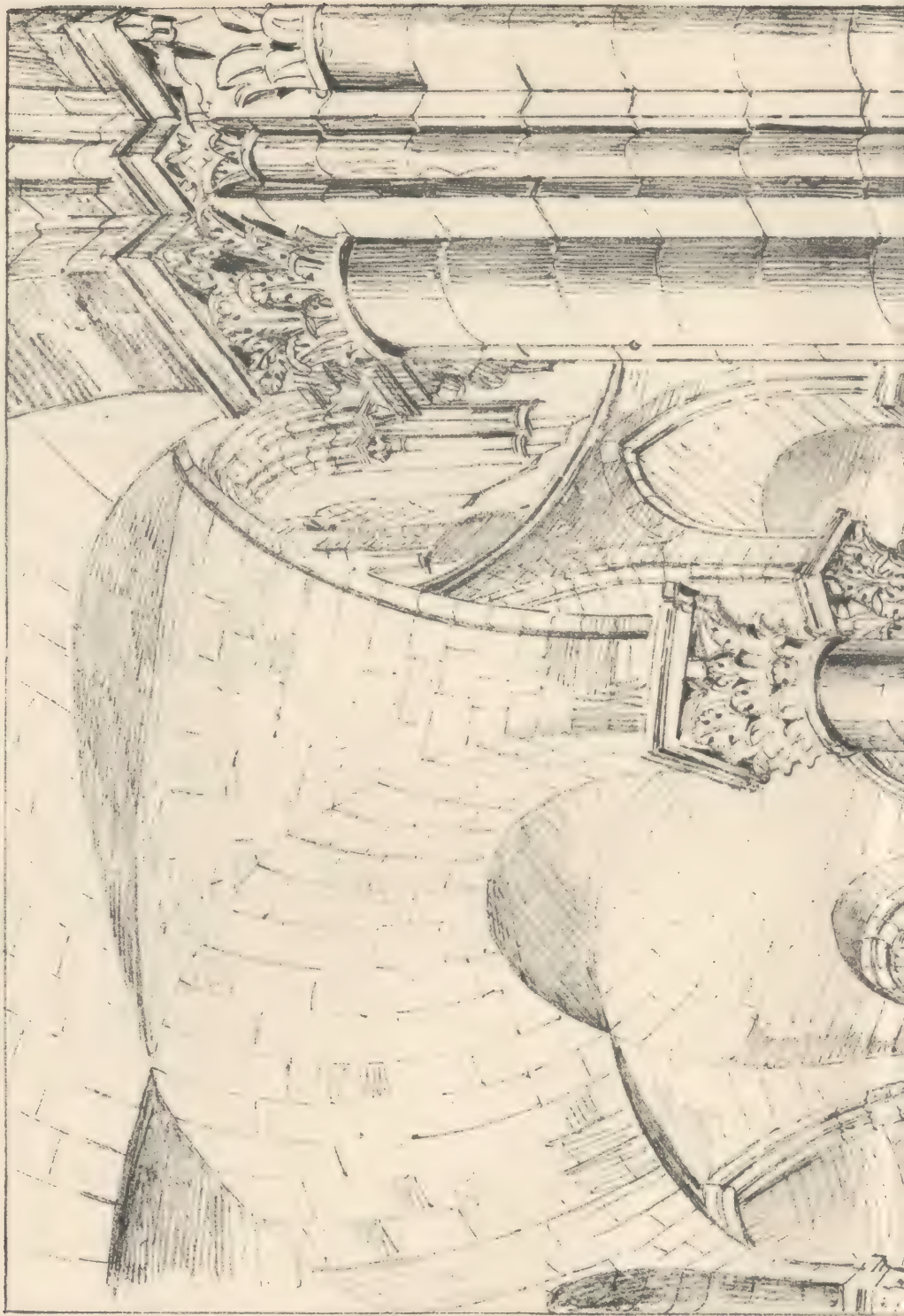
THE PUY-EN-VELAY, FRANCE.

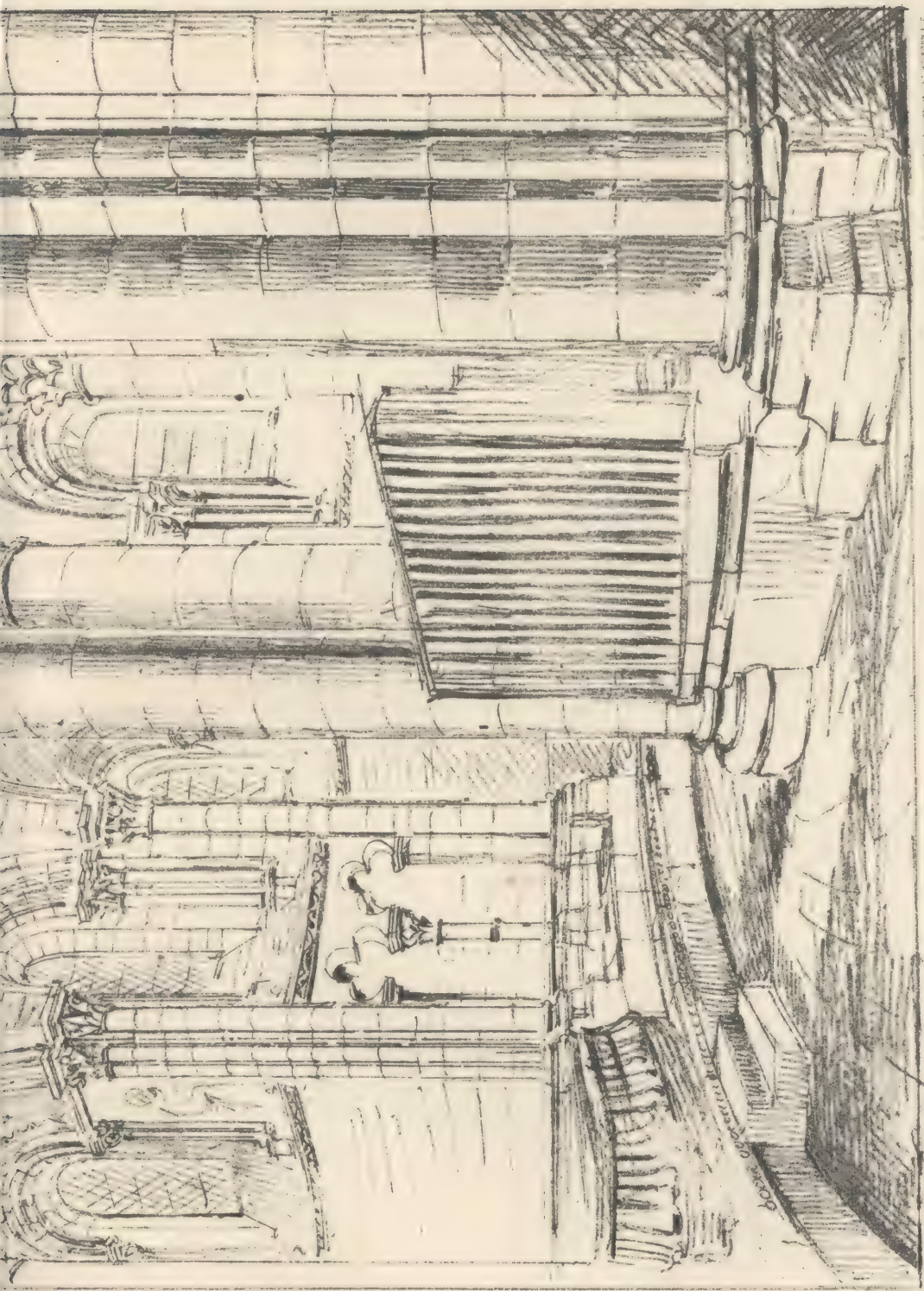
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TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL. V, NEW SERIES.
LXIV. THE LATE MR STREET'S CONTRIBUTIONS TO THE INSTITUTE (xxx)





3. S. Hart
AISLE AROUND CHOIR OF SAINT-JULIEN, AT BRIOUDE, FRANCE.

FROM A PENCIL SKETCH BY THE LATE MR STREET, R.A. PRESIDENT



obtain any light for a clerestory roofed and supported in this fashion, and one is rather disposed to wonder how it was that so many churches should have been built on the same gloomy scheme. It was, no doubt, because in that part of France wooden roofs were thought to be undesirable, and no other economical way was seen of combining the nave and aisles with what was intended to be an indestructible stone roof. I need hardly say that at the same period, in the north of France, in Normandy, and in England, the nave was seldom, if ever, roofed with anything but timber, and the aisles only were vaulted in stone.

At Tournus, on the Saône, another device was adopted to serve the same end as the Auvergne roof, but admitting of a clerestory: this was the covering of the nave with a succession of barrel-vaults at right angles to the length of the church, and supported on bold transverse arches. But I doubt whether it was ever repeated on a nave, though there are several examples of aisles thus roofed;* and it was, no doubt, ugly and ungainly. The Le-Puy architect devised yet another plan, which combined to some extent all the others, and this was, as I have explained, a succession of domical vaults, which, while it was much lighter and more practicable (owing in part to the difference of scale) than the Saint-Front plan of a series of genuine cupolas, achieved, nevertheless, much of the effect that was there gained. A very small portion only of the weight of the vault exerted a direct lateral thrust, and it was possible, therefore, to erect such a roof upon a clerestory; and though the transverse arches limit the height of the building in one respect, in another there is no question that the height is apparently much increased; for in looking down the interior it is impossible ever to see the apex of any of the domes, and the vault lost behind the transverse arches gains immensely in mystery and infinity, so as to produce the effect of a larger and loftier building than the reality. But, on the other hand, the disadvantages were great: the piers between the nave and its aisles were so large as to render the aisles nearly useless; and I can hardly wonder, therefore, that the example set here was not generally, if, indeed, at all, followed.

It is doubtful where the kind of vault used at Le-Puy was first devised. The central dome of Saint-Michel-de-l'Aiguille is, perhaps, the oldest of all, and this is, in fact, a square dome, if one may use the expression. The octagonal dome-vaults of the cathedral are probably a little later, but that over the crossing of the church of Ainay at Lyon may possibly be older. A comparison will make it evident that one is copied from the other; and if the Le-Puy vault was derived from Lyon, it becomes possible to make the important inference that it was an Eastern influence travelling up the Rhône, and distinct from that which is seen at Périgueux, to which we owe this kind of domed roof. Further evidence of this is found in the pendentives of the dome at Brioude,† which are identical in intention with the plan of the church of

this church is the end of the eighth or beginning of the ninth century, but I do not know what his authority for this very early date is.—G. E. S.

* The Abbaye-aux-Hommes, Caen, has its aisles roofed with transverse barrel-vaults.—G. E. S.

† I ought to mention that this dome and the western part of Saint-Julien at Brioude are much older than the choir, to which I have before referred in speaking of the date of the church.—G. E. S.

SS. Sergius and Bacchus, at Constantinople, and yet quite unlike the kind of pendentive common in churches of the Saint-Front type. They are, in fact, the Le-Puy and Ainay pendentives reduced to the very simplest conditions. The invention of the flying-buttress adumbrated in, and possibly suggested by, the quadrant vaults of Auvergne, finally stopped these various endeavours after new forms of roofs, and set men to work to see how it might most readily be made to serve the boldest and most airy systems of design and construction; and in the rage for these, that old system of roofing with domes, which had been, so far as is known,* first tried in France at Périgueux, and had afterwards spread with such rapidity over a very large district—though with many modifications and variations—was entirely ignored or forgotten. Is it well that we too should ignore it? It is clear that the disciples of the Gothic school may claim it as their own with just as much truth as any other school can; and in some form or other it is often so attractive—so majestic on a large scale, so impressive even on a small scale—that few of us who have much work to do should altogether eschew all use of it, or treat it as though it were the exclusive property of the architects of Classic and Renaissance buildings. I do not feel, however, as most who write on the subject seem to do, that our domes must invariably be supported on what are called true pendentives. I think they are not beautiful, and I do not see that they are especially scientific. The Saint-Front pendentives are mere corbellings out of the wall, and in truth only imitations of pendentives. At St. Mark's they are formed with a succession of arches of brickwork across the angle of the dome, though this construction is not visible, and these, I suppose, are all wrong; but they are very similar in their intention to the kind of pendentive which I have had to illustrate to-night, and which is in truth much more Gothic and picturesque in its character than the true pendentive, for it admits of any amount of decorative sculpture, and is really precisely similar in its object to the squinches under our own English spires.†

I will add but a few words as to the constructional polychromy which distinguishes the exterior of the churches throughout this volcanic district. So far as I have seen, it was never, save in Le-Puy Cathedral, admitted into the interior,‡ and this is much to be regretted, because it seems that the vaults of their naves, the domes of their crossings, and the semi-domes of their sanctuaries, would have afforded

* This qualification is necessary, for the curious evidence which M. Verneilh has given of the existence in the tenth century of a Venetian colony at Limoges would be enough to make it probable that, though Saint-Front is the earliest complete example extant of a French domed church, others may have been built before it, and that some of those which M. Verneilh supposes to have been derived from Saint-Front may really have been derived more directly from the East.—G. E. S.

† There is no end to the diversity of the countries in which they are found. In the cathedral at Worms there are squinches formed by semi-domes. In Saint-Nicodème at Athens they are identical with those of Saint-Étienne at Nevers, and the same form is repeated in the domical vault of the steeple at Auxerre Cathedral. At Notre-Dame-du-Port, Clermont, the dome is circular, but the squinches below are octagonal in plan, and the circle (which is not, however, a true circle) is set upon the octagon.—G. E. S.

‡ This statement must of course be made with caution, inasmuch as the invariable whitewashing of the interior makes it very difficult to say what was the exact nature of the decorations with which they were adorned.—G. E. S.

most admirable fields for this kind of decoration. As I have stated, the walls were once covered with painting, and as long as this existed a mosaic of black and white and dull red would have been valueless; but now that the iconoclast, the whitewasher, and the restorer have done their worst, the want of some decoration on the otherwise bald surface of the vaults is painfully felt everywhere. Externally the coloured materials are used in two ways: sometimes the whole of the wall is built of the dark volcanic products, and patterns are obtained by the occasional use of white stone or by alternate courses of this and the darkest *scoriæ* that can be found. Or else the walls generally are built of stone, and the patterns only formed with the dark material. Here, too, as is the case in all old examples of coloured constructions with which I have ever met, the colours follow the natural course of the construction. At Le-Puy, for instance, the courses are alternately light and dark, producing bold horizontal bands of colour. The arch stones are continued generally in one line of colour all across an arch, even when it consists of several orders, and from the arch on into the wall. The bands of ornament are similarly arranged in horizontal stripes, generally placed where they will dignify and give value to some very prominent architectural member. They never occur below the line of the springing of an arcade, and are richest under cornices and between their corbels. And when we consider the date at which this inlaid work was executed, and compare it with what we know of our own art at the same period, or, indeed, with that of any other portion of the country which is now France, we cannot too highly extol its delicacy and grace and its carefulness of design and execution. I believe that we may regard the whole of the work in Velay and Auvergne as that of native artists. The detail of sculpture is, when compared with such work as is to be found in Provence, exceedingly rude. It is vigorous, indeed, but wanting in that extreme delicacy and refinement which marks the work of the early Provençal artists.

It is probable that I have not carried you with me in my theory about the development of the perfect French *chevet* from the *chevets* of Auvergne, for I know how easy it always is to ride one's own hobby. The statement of this theory was, however, incidental to my remarks to-night. Originally, I intended only to give as good a description of the cathedral and other buildings of Le-Puy, as my two days' study of them would allow; and this, because I could not find any published plans or drawings of them, and I thought that the measured plans and sketches which I was able to give you would, therefore, have more value than would otherwise be the case. I found it impossible, however, to resist saying something of the churches of Auvergne, because they are so mixed with those of Velay, and it is difficult to enter fully into one without knowing something of the others also. It is almost equally difficult to enter upon the examination of churches such as these without starting some theories, about which there may be ample differences of opinion.

Were I to attempt to say anything about the buildings of a later date, it would be impossible to do more than give a catalogue, which would be as unintelligible as it would be tedious.

I will only say, therefore, on this head, that Clermont Cathedral well deserves careful study, and is rich in very fine glass; that at Montferrand may be seen as large a collection of mediæval houses of all dates as in almost any small town that I know; that Riom possesses a fine Sainte-Chapelle; and that in the Abbey of La-Chaise-Dieu is still preserved a very rare and complete series of tapestries of the sixteenth century. Besides these, a large number of articles of church-plate are to be found scattered up and down in the village churches, and all this goodly store of antiquities is set before you in a province whose physical features are so full of interest and beauty as in themselves to make a journey through Velay and Auvergne one which none will repent having undertaken.—GEORGE EDMUND STREET.

[2.]

THE CHURCH OF ST. MICHAEL-PENKEVEL, CORNWALL.*

[The late Sir William Tite, *President*, occupied the Chair.]

MR. PRESIDENT AND GENTLEMEN,—

I HAVE been asked to undertake the description of some work in progress just now under my direction (1862), and I have agreed, though with some hesitation, to comply with the suggestion. I have done so because it so happens that I am able to describe to you a work which has now been for some little time in progress in a far-away village in Cornwall, where all that I have done has been carefully and lovingly to restore and renew what had once—more than five hundred years ago—been built by pious hands, and afterwards, in a less reverent age, in part been allowed to fall to decay, and in part been ruthlessly destroyed. The very obscurity of such a monument seems to give it increased value, which is again enhanced when we find it standing almost alone in a large county, the pre-eminent monument of its age, and yet unknown, undescribed, and hitherto uncared for. I trust, therefore, that I may venture on the description of the Church of St. Michael-Penkevel without transgressing those bounds of modesty about the work of my own hands, which it were very unpardonable to forget.

Such a subject as that which I have chosen may serve, incidentally, some good purpose, in that it will lead naturally to the consideration of some of those questions of church arrangement, on which, as it seems to me, the minds of church architects ought to be well made up before they undertake the restoration of an ancient building, for the due celebration of all the Divine offices of the Church within its walls. I must, indeed, in passing, express a hope that the ventilation of this supplementary question may galvanise into life the committee which we appointed last Session, and suggest to

* The original Paper, which has been slightly condensed, was read on the 1st December 1862. It will be found in the First Series of TRANSACTIONS, 1862-63, pp. 32-49.

its promoter the advantage of taking some steps for bringing it forthwith into working condition. Since that committee was appointed, one of the most ruthless schemes of destruction has been accomplished; and it is to an honorary member of this Institute, and not to our professional Committee, or to our Council, that we owe the most vigorous of the protests* which have been uttered against the destruction of the noble Guesten Hall, at Worcester, which has followed so few years after the similar destruction of the Deanery Hall in the same cathedral city, and the fine Refectory at Malvern, that one is almost tempted to suspect the existence of a deliberate scheme for sweeping away all the historic landmarks of the district!

Many of us, fortunately, are able, as I am to-night, to give evidence that this carelessness about and contempt for our old monuments are not universal. The church to which I call your attention is the parish church of Lord Falmouth's seat at Tregothnan, and I have been entrusted by his Lordship with its faithful restoration, the only condition being that every old feature should be jealously preserved and carefully brought to light, and that additions to the old work should only be made where it had already been so far defaced as to make the attempt to restore the existing work a mistaken and useless labour.

It will be convenient first of all to give such historical illustrations of the fabric as are accessible, and then to describe its architectural features in detail.

The first record of the church is that of its consecration by Bishop Bronescombe,† on 13th August 1261, in honour of St. Michael. This is given by Dr. Oliver, in his *Monasticon* [*Monasticon Dioc. Exon.*, p. 66]. At this time the advowson of the church was attached to the manor of Fentongollan. This manor originally belonged to a family of the same name, from whom it passed by a succession of female heirs to the families of Trejago (written Trejago, Trejagu, and Triagu) and Trenoweth. It is to a member of the first of these families that most of the existing church must be attributed, though in the Chantry Rolls of Devon and Cornwall, among the records of the late Court of Augmentations in the Record Office, there is the following statement, referring to a foundation here by one of the Trenoweth family:—"The Stipendarye called "Trenouthes, founded by John Trenoweth [who had the manor of Fenton Galleth] to "fynde a pryste to pray for his sowle in y^e Paryshe Church of Saynt Michell Penkevell: "and he to have an annuall pencon of c^s and an obytt [to] be yerely kept at which "everye pryst present shuld receyve vi^d for masse, with ij^s vj^d, to be distributed yerely

* The earliest protest was made as long ago as 1854, by a sub-committee of the Worcester Architectural Society, of which I was a member. The Report which we drew up is printed in the *Transactions* of the Society, and is illustrated by some drawings of mine. But Mr. F. T. Dollman has illustrated it more carefully in his *Analysis of Ancient Domestic Architecture in Great Britain*.—G. E. S.

† Since this Paper was written, the original foundation stone of the church has been discovered in the north-east angle of the chancel; it is a piece of granite about five inches thick by two feet six inches square, and on one side is this inscription. This no doubt is the stone laid in the time of Bishop Walter Bronescombe, as the part of the church in which it was found was certainly not altered at the time extensive works were undertaken in the episcopate of his successor Walter Stapledon.—G. E. S.

SCS	MICHA
WAR	EPI.
AR	CHA.

" amongst pore peple." The date of this foundation is not given, but John Trenoweth died in 1497. The work of the Trejago family is much older, as is proved by a most valuable deed, which Dr. Oliver has printed for the first time, executed by Walter Stapledon, the learned, pious, and martyred Bishop of Exeter, given in Exeter, 7th February 1319, and endorsed, "*Ordinacio Archipresbiteratus de Penkevel in Cornubia.*" This deed recites the petition of Sir John Trejagu, patron of the Church of St. Michael of Penkevel, which says that he had, at his own cost, now recently altogether repaired the said church,* in which he proposed to found a chantry for four chaplains, where perpetual prayers might be offered for himself and his Lady Jane, and his parents John and Agnes de Trejagu; for Walter Stapledon, then Bishop of Exeter; his brother Sir Richard Stapledon, Knight, and his parents William and Arabella Stapledon; for the King, for Simon and Lucy Trejagu, Stephen and Melora de Trewarthenick, and others. The proposal was approved and confirmed by the above Bishop, who erected the church into a collegiate one, and the head chaplain of the four clergy who served it into an archpriest,† who was specially charged with the care of the parishioners. The archpriest's Socii, or fellows, were to live under his roof, share his table, and receive from him yearly two marks, "*pro stipendio et robâ suâ.*"

Soon after this, on the 4th of May 1335, an Indulgence was issued at Avignon in favour of this church, and the original is still preserved in the muniment room at Tregothnan. Lord Falmouth has kindly given me a copy of this instrument. It was found by that accomplished antiquary, the Rev. Lambert B. Larking, in the course of his examination of the Tregothnan muniments, and I avail myself of his translation,

* I give the original of some portions of this deed:—"Oblata siquidem nobis domini Johannis de Trejagu, militis patroni Ecclesie Sancti Michaelis de Penkevel, nostre diocesis, que de nostro feodo existit, petitio continebat, quod cum in eadem ecclesia, quam suis propriis sumptibus jam noviter reparavit in totum, ob honorem Dei quandam cantariam quatuor capellanorum qui, in ipsa ecclesia divinis obsequiis jugiter intendentes, diebus singulis pro salubri statu nostro," &c., &c., "orare ac celebrare debeant," &c. The deed then goes on to endow the archpriest with the emoluments of the living, and then, "Hujus modi vero archipresbiter sic ut premissis institutus tres capellanos viros utique ydoneos et honestos de ipsius fundatoris vel heredum suorum assensu eligat et assumat, quos absque causa rationabili nolumus amoveri, qui preter horas canonicas et missam de die quas ab omnibus cappellanis in ipsa ecclesia seu parochia horis competentibus dici precipimus in communi plenum obsequium tam pro vivis quam pro defunctis, videlicet, Placebo, Dirige, et commendacionem ac tres missas pro animabus prenominatorum vel duas ad minus et tercia de Sancta Maria, in qua nichilominus commemoracionem pro dictis tam vivis quam defunctis fieri volumus in eadem ecclesia seu parochia, cessante impedimento legitimo, dicere cotidie teneantur, uno semper, videlicet archipresbitero predicto, circa curam parochie et jura episcopalia et archidiaconalia cum oportuerit exhibenda sumopere vigilante." "Ita tamen quod tam ipse quam alii capellani quos sibi socios appellabit in eadem domo simul cotidie se simul et similiter reficiant et habitent in communi." And, finally, that the archpriest is to pay these fellows "*pro stipendio et robâ suâ singulis annis duas marcas ad duos anni terminos, videlicet, in festo pasche et Sancti Michaelis pro equalibus porcionibus.*"—G. E. S.

† I do not know whether the appointment of an archpriest is common. I find mention of one in Dr. Oliver's *Monasticon* at St. Michael's Mount, where it is said, there are "three Prysts to celebrate there, one of whom ys named y arch pryst." Bingham (*Origines*, Book II. chapter xx. sect. 18) gives an account of the office of the Archipresbyter, which does not tally with the office held in this church, which seems rather to have been like that of the Cardinal Presbyter, or, perhaps, rather the Deanery of a Collegiate church. The first archpriest of St. Michael-Penkevel was the "*Dominus Willhelmus,*" mentioned in the Indulgence printed on the next page.—G. E. S.

which has never yet been printed. It is worth reading on account of the particularity in which these out-of-the-way bishops seem to have thought themselves empowered to deal with the interests of this little Cornish parish, and almost without reference to the Bishop of Exeter. The translation of the Indulgence,* which is sealed with a noble seal, is as follows:—

“ To all the Sons of the Holy Mother the Church, to whom the present letters shall
“ come—

“ We, by the Divine mercy, Georgias, Bishop of Feltri and Belluno ; Salmannus,
“ Bishop of Worms ; Bartholomew, Bishop of Cl—(?) ; Boniface, Bishop of Corvania ;
“ Galganus, Bishop of Laveria : and Raymund, Bishop of Caph (?)—Health in the
“ Lord everlasting.

“ The Brightness of the Father’s glory, which illuminates the world with its in-
“ effable brilliance, then more especially accompanies the pious vows of the faithful (who
“ are full of hopes from his most merciful Majesty) when their devout humility is united
“ to the merits and prayers of the Saints.

* An Indulgence for forty days, for services in and to St. Michael-Penkevel Church, dated 4th May 1335. The original is here given:—

Universis Sancte Matris Ecclesie filiis ad quos presentes littere pervenerint—

Nos miseratione divina, Gorgia Fettrensis et Belluensis Episcopus,—Salmannus, Wormaciensis Episcopus,
—Bartholomeus, Clofensis Episcopus,—Bonifacius, Corvaniensis Episcopus,—Galganus, Laveriensis Episcopus,
—et Raymundus, Caphensis Episcopus—Salutem in Domino sempiternam.

Splendor paterne glorie, qui sua mundum ineffabili claritate illuminat, pia vota fidelium de clementissima
ejus majestate sperantium, tunc precipue benigno favore prosequitur, cum devota ipsorum humilitas sanctorum
meritis et precibus aduniatur.

Cupientes, igitur, ut ecclesia Sancti Michaelis Archangeli de Penkevel, Exoniensis dioceseos, in ejusdem
Sancti Michaelis veneratione consecrata, congruis honoribus frequentetur, et a Christi fidelibus jugiter
veneretur.

Omnibus vere penitentibus et confessis, qui ad dictam ecclesiam, in singulis ejus patroni festivitibus, et
in omnibus aliis infrascriptis, videlicet, Nativitatis Domini, Circumcisionis, Epiphanie, Parasceves, Pasche,
Ascensionis, Pentecostes, Trinitatis, Corporis Christi, Inventionis et Exaltationis Sancte Crucis, Nativitatis et
Decollationis Sancti Johannis Baptiste, Beatorum Petri et Pauli Apostolorum, et Omnium aliorum Apostolorum
et Evangelistarum, In commemoratione Omnium Sanctorum et Animarum, et in singulis festis beate Marie
Virginis, et in omnibus aliis festis Sanctorum et Sanctarum, quorum seu quarum reliquie vel altaria in dicta
habentur ecclesia, necnon a festo Sancti Michaelis in Septembre, usque ad festum Sancti Luce Evangeliste, et
per octabas omnium predictarum festivitatum octabas habentium, et in dedicatione ejusdem, et in singulis
diebus dominicis, causa devotionis, orationis, aut peregrinationis, accesserint : Seu qui missis, predicationibus,
matutinis, vespers, aut aliis quibuscunque divinis officiis ibidem interfuerint, aut corpus Christi et oleum sac-
rum, cum infirmis portentur, secuti fuerint, vel in serotina pulsatione campane, secundum modum Curie
Romane, flexis genibus sex Ave Maria dixerint—vel dictam ecclesiam et ejus cimiterium, pro animabus cor-
porum inibi jacentium exorando, circueverint ; Necnon, qui ad fabricam, luminaria, ornamenta, aut quevis alia
dictae ecclesie necessaria, manus porrexerint adjutrices, vel aliquid suarum donaverint vel legaverint facultatum,
et qui ad sustentationem sacerdotum ibidem celebrantium pias elemosinas dederint, aut fecerint, aut procura-
verint, et qui pro dominis, Johanne de Triagu, milite, dictae Cantarie fundatore, ejus uxore et liberis, ac domino
Willelmo, primo archipresbitero, oraverint.

Quotiescunque, quodocunque, et ubicunque, premissa, vel aliquid premissorum, devote fecerint—de
Omnipotentis Dei misericordia, et beatorum Petri et Pauli Apostolorum, ejus auctoritate confisi, singuli nostrum
quadraginta dies indulgentiarum de injunctis eis penitentiis misericorditer in Domino relaxamus, Dummodo
Diocesani voluntas ad id accesserit et consensus.

In cujus rei testimonium sigillorum nostrorum presentes litteras jussimus appensione muniri.

Datum Avinione, iiii die Maii, anno Domini MCCCXXXV^o et Pontificatus domini Benedicti Pape xij anno
primo.—G. E. S.

“ Desiring, therefore, that the Church of St. Michael the Archangel of Penkevel, “ in the Diocese of Exeter, consecrated in veneration of the said St. Michael, be frequented with suitable honours, and be continually venerated by the faithful in Christ.

“ To all true penitents who have been confessed, and who shall attend the said “ church on each festival of its patron, and on all the other festivals below enumerated, “ viz., The Nativity of our Lord, The Circumcision, The Epiphany, Easter Eve, Easter “ Day, The Ascension, Whit Sunday, Trinity Sunday, Corpus Christi, The Invention “ and Exaltation of the Holy Cross, The Nativity and Beheading of St. John the “ Baptist, The Blessed Apostles St. Peter and St. Paul, and the festivals of all the other “ Apostles and Evangelists, The Commemoration of All Saints and All Souls, and on “ each of the festivals of the Blessed Virgin Mary, and on all the other festivals of “ Saints whose relics or altars are in the said church. Moreover, from the festival of “ St. Michael, in September, to the festival of St. Luke the Evangelist, and through “ the octaves of all the aforesaid festivals which have octaves, and on the dedication “ of the said church, and on every Sunday, for the purpose of devotion, prayer, or “ pilgrimage; or, to those who have been present there at masses, sermons, matins, “ vespers, or any other divine service; or who have followed the body of Christ and “ the holy oil when they are carried to the sick; or who, on bended knee, have said “ six Ave Marias, at the ringing of the evening bell, according to the usage of the “ Roman Church; or who shall have made the circuit of the church and churchyard, “ praying for the souls of the bodies lying therein. Also, those who have held forth an “ assisting hand to the fabric, lights, ornaments, or any other necessities of the said “ church; or who shall have given or bequeathed to it any of their means, and those “ who have given or done or procured pious alms for the support of the priests ministering there, and those who have prayed for Sir John Triagu, Knight, the founder of the “ said chantry, and his wife and children, and Sir William the first archpriest there.

“ As often, when and wheresoever they shall have devoutly performed the premisses, “ or any of the premisses, of the mercy of Almighty God and the Blessed Apostles St. “ Peter and St. Paul, relying on His authority, each of us, mercifully in The Lord, release “ to them forty days indulgences from the penances enjoined upon them,—Provided “ the will and consent of the Diocesan consent thereto.

“ In testimony whereof, we have ordered the present letters to be fortified by “ appending our seals.

“ Given at Avignon, the 4th day of May, in the year of our Lord 1335, and the “ Pontificate of our Lord Pope Benedict the 12th, the first.”

Mr. Larking also found a paper of complaints of the parishioners against one Oliver Carminow put before Counsel, with the opinions given thereon, *circa* 1590–1610. From these it seems as if he had been churchwarden, and had refused to give up the parish property; for he is charged with having a chalice belonging to the parish. And again, in speaking of the “ aisle ” (evidently the south transept), in which the Carminow family used to sit, the complainants state, “ In the foresaid Ile was an “ altar stone, which Olyver caused to be put on his father his grave.” Opinion, “ He

" must compounde with the Parisshe for it." And this stone is still in the pavement, marked with the five crosses—which proves it to be the altar stone—and with the letters J. C., the initials of John Carminow. These Carminows were descended from John Carminow, of Resprin, who married the eldest daughter of John Trenoweth, already mentioned as founder of a chantry in this church. Thomas, son of the first Carminow, was Gentleman of the Privy Chamber to King Henry VIII. John his son (according to Hals) " kept open house for all comers and goers, drinkers, minstrels, " dancers, and what not, during Christmas-time ; and his usual allowance of provision " for these twelve days were twelve fat bullocks, sixty statute bushels of wheat, thirty-six " sheep," &c. His son Oliver Carminow, who appropriated the old altar stone, squandered his estate of Fentongollan, and in 1603 Sir Nicholas Hals bought it, and of his family Hugh Boscawen bought it in 1676, and " pulled down the mansion, with its lofty towers " and fine chapel,* " which was dedicated in honour of the Virgin Mary. The other estates in the parish in time all came into the hands of the same family : Tregothnan, in the fourteenth century, by the marriage of Boscawen of Burian with its heiress ; and the manor of Penkevel, which came from the Penkevels to the Courtnays, and from them to the Boscawens. The advowson, " together with some chantry-lands," was purchased by Hugh Boscawen from John Hals [Lyson's *Magna Britannia*, iii. p. 234].

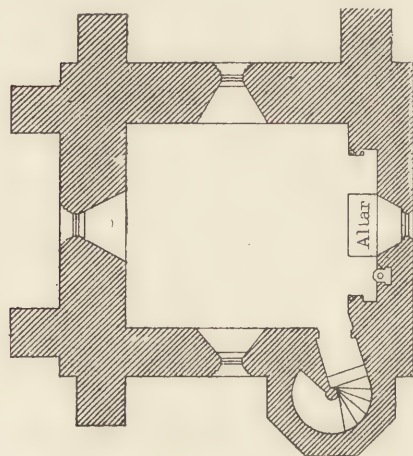
I hope I need not apologise for troubling you with this dry introductory matter ; but it appears to me to be always important to fix the date of any ancient work, and here we are able to do so with what seems to be the most complete certainty ; and it happens fortunately that the documentary evidence thus afforded tallies accurately with the architectural character of the fabric.

The plan of the church at present is cruciform, with a western tower ; and though at first sight the whole work appears to be of much about the same date, a careful examination disproves this. The original church, consecrated in A.D. 1261, had probably a nave and chancel only, and no transepts. The side chancel windows are, I take it, of this date, and there were some slight remains of the inside arch of an early window in the north wall of the nave, which was afterwards blocked up in order to insert a fourteenth-century window. The arch into the south transept had also somewhat of an early look, but, on careful examination and dissection, I found that its western jamb was made up of a portion of a thirteenth-century doorway, which is conclusive evidence of its not being original ; and, besides this, the transept wall is built against the nave wall, and not bonded into it. The walls of chancel and nave have a sort of plinth formed by the sloping of the foot of the walls outside, a feature which is not seen in the

* " Fentongollan had heretofore upon its lands many large and commodious houses, as halls, parlours, " and dining rooms, a notable tower and bell, three storeys high, and a chapel adjoining thereto for divine " service, and two large gatehouses at each end of the town, which fabric the writer hereof hath often seen in " his youth, when his grandmother lived in it," but " those houses are all pulled down, and the chief stones " thereof carried to build the gates and houses of Tregothnan." This is Hals' account given in Davies Gilbert's *Par. Hist. of Cornwall*, iii. 209 ; but it can be only in part true, as the house at Tregothnan in his time was an ancient mansion.—G. E. S.

transepts, tower, or porch. The whole remainder of the church was evidently altered and re-modelled just before the date of the instrument which I have quoted—*circa* 1300–1319—and some time before the Indulgence given at Avignon in 1335.

The whole scheme of the building was remarkable. In this small church, in order to provide for the four chantry priests, four altars were required. The first already existed at the east end; places for two more could be found by the erection of transepts; and for the fourth, that never-failing ingenuity which marked our old architects was taxed, but not in vain. The large and stately tower was brought into use, and on its first floor, under an arch in the wall, the fourth altar was built, with its little eastern window over it, opening just above the ridge of the roof [see diagram]. Over the porch was another chamber—probably the Sacristy—entered from the same staircase that leads to the altar and to the roof of the tower; and there were two staircase turrets on the east side of the transept, which led, no doubt, to the rood-loft, and of which only slight fragments remained.



PLAN OF CHAPEL IN 1ST FLOOR OF TOWER.

Subsequent to this re-foundation of the church, the alterations were generally for the worse. First, in the fifteenth century, the roofs were renewed, and no trace left of their original design. Subsequently, and by degrees, the walls were coated with monuments to the Boscawen family and others; some windows were blocked up, others in part destroyed; the east window was destroyed; piscinae, doors, niches, &c., carefully concealed; the roofs badly repaired and under-ceiled; the upper room of the porch removed; the tower lowered and shorn of its fine

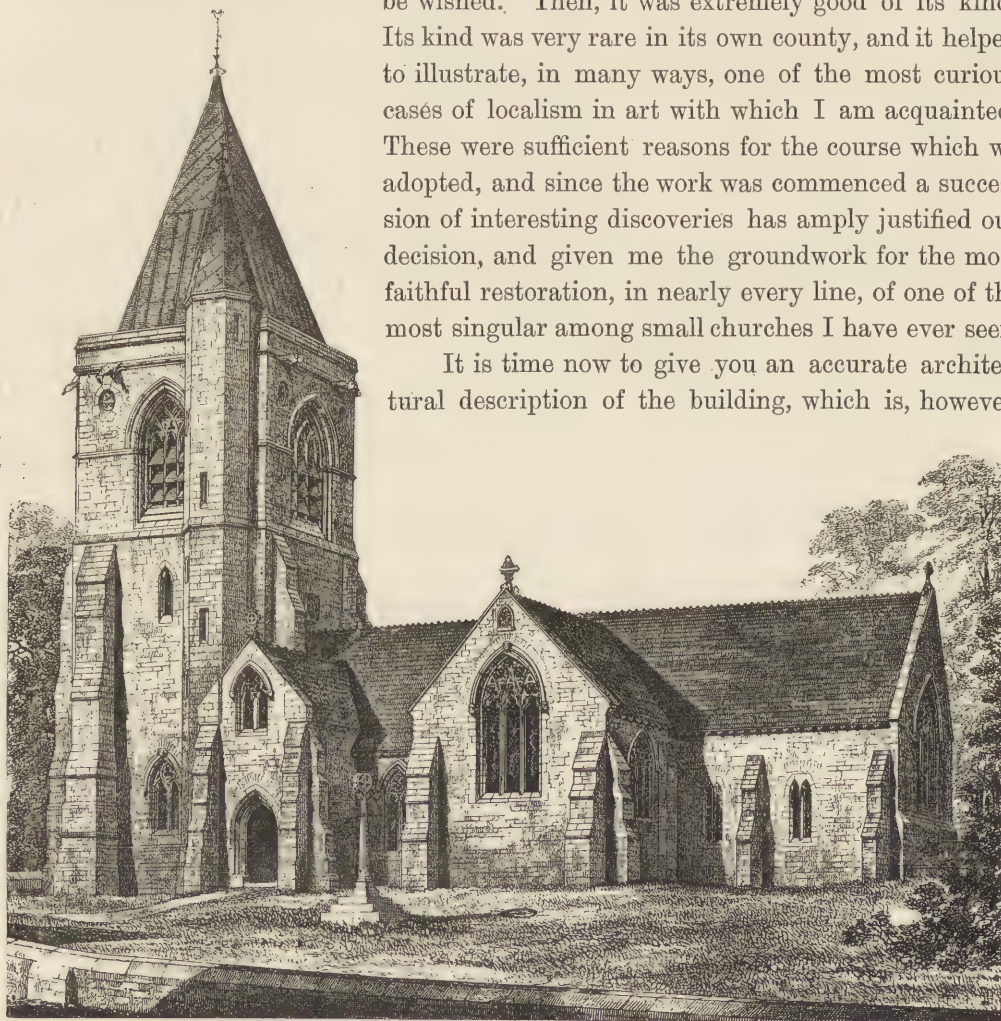
proportions; the bells, with the exception of one (I think), sold; and, finally, the whole interior of the church divided elaborately into panels, with plaster mouldings, rosettes, and what not, until it looked like the outer hall of some dingy seventeenth-century house rather than a church. Unfortunately the work was not only damaged, but in itself defective, the walls being almost all very badly built, and much of the wrought stonework decayed, and the tower in particular threatening the whole building with destruction.

It was absolutely necessary to do something in the way of repair, and it soon became manifest that the work was one which would be, at the least, as costly as, and far more troublesome than, the erection of an entirely new church; and it is quite open to discussion whether, in such a case, restoration of the old or invention of a new work is the right course to adopt. It may fairly be asked, where all must be, at least, more than half new: Would it not be better for art, and better for the artist, that he should be encouraged to devise some entirely new work, washing his hands altogether of the men who, five hundred years before, had done their best?—only imitating the

heartly way in which here, as so often elsewhere, the fourteenth-century architects had swept away everything of the thirteenth-century building that in the least interfered with their scheme, and left us nothing but their own handiwork?

But there were many and grave reasons here why such arguments should not be listened to. The work had its history—and this is a much rarer thing than could be wished. Then, it was extremely good of its kind. Its kind was very rare in its own county, and it helped to illustrate, in many ways, one of the most curious cases of localism in art with which I am acquainted. These were sufficient reasons for the course which we adopted, and since the work was commenced a succession of interesting discoveries has amply justified our decision, and given me the groundwork for the most faithful restoration, in nearly every line, of one of the most singular among small churches I have ever seen.

It is time now to give you an accurate architectural description of the building, which is, however,



VIEW OF THE CHURCH AFTER RESTORATION.

explained by drawings. The church is now cruciform, with a western tower and south porch [Illustns. xxxi.—xxxiii.]. There is not, and there seems never to have been, a chancel arch; and the tower arch springs from corbels in the side walls, and, being of the same width as the nave, gives great increase of length to it. At the same time it is a defective arrangement, for so important a feature as a tower ought to be seen and felt, not only outside, but inside also. The south transept is set singularly askew; and I am unable to suggest any reason for this, unless, as sometimes happens to us now, its

builder was hampered by the position of some grave in the churchyard of the older church. The length of the chancel is only one-fourth of the whole length of the church inside. It is, indeed, unusually small and insignificant. I suppose the Trejagos and Trenoweths built their transepts, and felt comparatively little interest in the principal altar; and they endeavoured, no doubt, to keep up as much as possible of the old walls, with the usual unsatisfactory result. I have been obliged entirely to rebuild the steeple: it was in a ruinous condition, and, though heavily buttressed on all sides, so badly built as to be unsafe. Moreover, there was no proper space in it for the bells; the belfry was very low and mean, and its whole upper stage seemed to have been altered and modernised. I am informed by Mr. Webber, the present rector of St. Michael-Penkevel—representative of the old arch-presbyter—that there is some record of the tower having been lowered by Admiral Boscawen (who died in 1761), in order that it might not present a landmark to the enemy; and in 1767 it appears from the parish books that a small sum was spent on the lead and other portions of the roof. The belfry window on the north side looked like the lower part of an old window, but the others were very poor and modern looking. The new steeple, therefore, follows the old work up to the level of the bottom of the belfry; and I have added a belfry stage, with lofty roofs to the tower and its staircase turret. The buttresses are rebuilt pretty much in their old form. They are certainly larger than is necessary, but they gave much of its massive solid character to the old work, and, I think, they have given the same effect to the new. In these days massiveness and solidity are too seldom attempted; we strive too much to attain the greatest effect at the least expenditure, and the result is, that we fail to give that sense of grandeur which the simpler, but more solid, old work seldom failed to give. The lower stage of the tower is lighted by a two-light window on either side, and entered by a doorway with chamfered and moulded jambs, carefully stopped near the ground; over this doorway was a window, which I have restored. The tracery in these windows was all destroyed. The tower arch is a pointed segmental arch, springing from corbels supported by two full-length figures. These were completely concealed by a western gallery, and are so damaged that it will be necessary to insert new figures. The staircase turret is at the south-east angle of the tower. The first door which opened out of it led into a room over the porch. This room was destroyed, though, in addition to the existence of the door, the porch walls remained so high from the ground as to prove that the chamber must have been erected. The probability is, that it was a sacristy rather than a parvise. There is no other place for one, and, with four altars to serve, it would have been difficult to dispense with it. It was not a residence for a priest, as has been suggested, because, as we have seen, the archpriest and the three chaplains lived together in a collegiate house.* I have, in rebuilding the porch, rebuilt this room above it, and it is again to serve as the priest's vestry. The entrance to it is by a door with a square trefoiled head. A

* Hals describes "the convent house in the churchyard still extant, for the chanter's residence." It was therefore, still standing in his time. *Par. Hist. of Cornwall*, iii. 208.—G. E. S.

few steps more of the newel staircase lead to the chapel in the tower, where, under a recessed segmental arch in the eastern wall, stood the altar, built up of solid masonry, and with a piscina by its side. Over the altar is a small vesica-piscis shaped window, enclosed outside within a square panel formed by the label-moulding. There was, perhaps, a certain amount of unreality in the extreme conservatism of the course which I have adopted here, but the arrangement was too curious and too unique to be destroyed, and I have, therefore, had all the stones carefully replaced exactly in their old places in the new tower, and the arch, altar, piscina, and window are, I trust, now likely to last longer than they have yet done.

The belfry windows are large, with bold oak luffers, and there is ample room for the peal of six or eight bells which the noble founder proposes to provide.* The steeple is covered with lead, and from the parapet of the tower over the house at Tregothnan—built by Wilkins—may be seen, on one side the distant sea, then the well-stocked deer park, sloping down to the wooded banks of the Truro river—one of the loveliest of which the South Coast can boast—and on the other side, one of those characteristic views which all who know Cornwall will recollect: bare rounded hills, treeless and forlorn, stretching away far as the eye can see, with here a mining chimney, and there an old lichen-covered and pinnacled tower breaking the monotony of the horizon. The nave proper is short, and had north and south doorways, one window of two lights on each side, and then the arches opening into the transepts. The south door has well-moulded jambs, and opens into the south porch, of which I have already spoken. The north door is simpler, and, before the restoration, opened into a modern vestry, erected against the north wall of the nave. The windows were both destroyed, and that on the north blocked up. Here, therefore, I cut into the wall, and found the jambs and sills and inside arch, but no remains of the tracery. I have been obliged, therefore, to insert new tracery, only retaining the old outline and jambs, and inside arch. The transept arches differed: that on the south was a circular segmental arch of two chamfered orders; this looked early, but it was partly made up of older work, and was altogether in so ruinous and decayed a state that I have thought it safer, on the whole, to repeat exactly the arch on the opposite side, opening into the north transept. This is a pointed segmental arch, richly moulded, with a label on the side towards the transept only. The two transepts [Illustn. xxxii.] are the most interesting portion of the whole church. They are curiously similar in all their arrangements, which are of a very unusual kind. The south transept had a three-light window in the south gable, of which the tracery was destroyed, and another in the east wall, which had retained its old rich tracery nearly intact. Below the south window is an arched recess for a monument, and, to the east of this, are two sedilia with cinque-foiled heads under segmental arches. The altar stood, no doubt, under the east window, and to its right-hand side in the east wall is a very richly moulded piscina. To the

* "This church, being a quarter cathedral to the Bishop of Exeter, the old bells in the tower of St. Michael-Penkevel were baptized, as appears from their names subscribed in them, St. Michael and St. Mary." Hals, *Par. Hist. of Cornwall*, iii. 210.—G. E. S.

left of the window is a most complex arrangement of doors and niches. There is the old door into the rood-staircase turret, and above, to the left, the doorway which opened from the staircase on to the rood-loft. Above the lower door is an arch recessed about six inches in the wall, which at first looked like a doorway, but which was in fact, I suppose, a niche for a figure. Under the upper doorway I found a square-headed recess, which was entirely stripped of its old enrichments. However, among the fragments which I found in various parts of the modern filling-in of the windows and niches, were various fragments of very small delicately moulded tracery. After long exercise of ingenuity, I managed to piece together enough of this work to prove, beyond doubt, that it came from this recess, and my drawing shows it restored. What this triple niche—as it turns out to have been—contained it is impossible to say; probably three sculptured figures, though the fashion for introducing paintings at this period, of which we have documentary evidence in the works of Bishop Stapledon, at Exeter, makes it possible that these shallow recesses were rather for paintings than for sculpture. The north transept has all the same arrangements as the south. Here, however, the founder's tomb, and two sedilia in the north wall, were not enough; and a third seat is obtained in the eastern wall, on the left hand of the altar, which, it is just possible, may have been provided for the archpriest. Sedilia in a north wall are extraordinarily rare, if not unique, and in the eastern wall, I fancy, quite so. To the right of the altar was another piscina, very richly moulded, a door leading to a second rood-staircase turret, with a second door above, opening on to the loft, and a recess corresponding with that already described in the south transept—through which (at a later date, I think) a hagioscope had been made into the chancel. This recess had tracery of the same kind as the other, but different in its pattern, and which I have also been able to reconstruct from the fragments.

There are one or two points about the tracery in the recess of the south transept which are quite worth mention, inasmuch as they distinguish the work of old masons from anything ever done at the present day. The way in which the mouldings are worked is very peculiar. With the same general section, and the same thickness from back to front, they, nevertheless, vary in almost every part of the work; and this variation is designed beyond a doubt. It seems that the mason must, first of all, have designed the leading lines of his tracery, which he struck out with his compasses; he then designed the openings, and wherever the strict carrying-out of the moulding would leave little or no piercing in the spandrels of the tracery, he sacrificed the symmetry of his moulding, and, to use a modern phrase, "cooked" it. We all know that the earliest designers of tracery looked only to the shape of the piercings in the slab of stone; that after them came men who strove to unite good leading lines and good piercings; and after them, again, others who sacrificed the piercings altogether, and, troubling themselves only about the lines of their tracery, in the end completely destroyed all its nobility. Now, here we have a man at work, just at the very moment of transition from one style to the other. As a young man he may have wrought at severe geometrical traceries, and he was, probably, taught to think only of

the fine and perfect form of the openings. He lived long enough to find lines all the fashion, and gave way to the fashion, but, in the end, his early education prevailed, and he did his best to make his piercings therefore regular and good and let the mouldings take care of themselves. This tracery is all in small fragments, and you will agree with me that if I find a mason who can, or who will if he can, copy it, I shall be very lucky. Indeed, in looking at work of this kind, it is impossible not to feel the force of Mr. Wyatt Papworth's claims for the "master-mason,"* as the real author of much, at any rate, of the details of these old works; for none but the man who wrought the work with his own hands would have been likely to devise so ingenious a way of improving its effect. It is, certainly, not the sort of thing that any one, nowadays, making a design by means of an assistant, would ever think of doing.

The tracery in the recess in the north transept is not very admirable, being confused and eccentric. The gables of both transepts are similar in having above their windows small openings full of minute tracery. These were completely concealed by plaster, as also were most of the niches, piscinæ, &c., which I have described in the transepts. The buttresses of the south transept are plain, those of the north transept are finished with gables, arranged with sockets for finials; and among other fragments I found half of a small cross, which there is no doubt came from this place. The rood-staircase turrets had been completely destroyed, but when we discovered their doors, we found heaped together, in the hole in the wall behind them, the broken fragments which have already been mentioned. The chancel, as I have already said, is of earlier date than the rest of the church, and is lighted with two-light windows, with simple and effective cusped heads. The east end was all modernised, but there were traces of two niches, one on each side of the altar, also of what seemed to be jambs of a door in the south wall. Beyond the chancel is an enormous burial-house, built by one of the Lords Falmouth. There are very few coffins in it, so that I hope I shall be able to reduce its size considerably.

There are several features in the architectural detail to which I ought to call your attention. Almost all the arches have had labels with carved heads introduced, not only as terminations, but also as key-stones. This, I need not say, is a most rare arrangement, and certainly a disagreeable one. Under the window-sills inside were generally short stringcourses, the length of the window, which have been everywhere cut away by the plasterers, as also have been all the labels throughout. Everywhere, however, their outline remains, and among the fragments are many which give all the needful authority for their restoration. The cusping is generally very slightly ogee in its character, and one of the windows, of which I discovered the fragments walled up in the west wall of the north transept, has a later look than the ascertained date of the building; it is really, however, very similar to the tracery-opening in the gable of the south transept, which is, beyond any doubt, part of Sir John Trejago's work.

* See Mr. Wyatt Papworth's "Notes on the Superintendents of English Buildings in the Middle Ages," in *TRANSACTIONS*, Vol. III. N.S., pp. 185-234.

The roof, as I said at starting, had been modernised and then ceiled; it contained, however, a good deal of the old carved oak work so frequently met with in the cradle roofs of Devon and Cornwall. I hope to be able to preserve this work in a part of the new roofs. One curious feature is the great carved beam which occurs over the transept arch, cut to a considerable curve, in order to clear the arch. None of the roof appeared to be of the same age as the church.

It would be wearisome and unprofitable to dilate at greater length on the architectural character of this little church; but there are other points to which the description I have already given naturally leads, and on which I must say a few words.

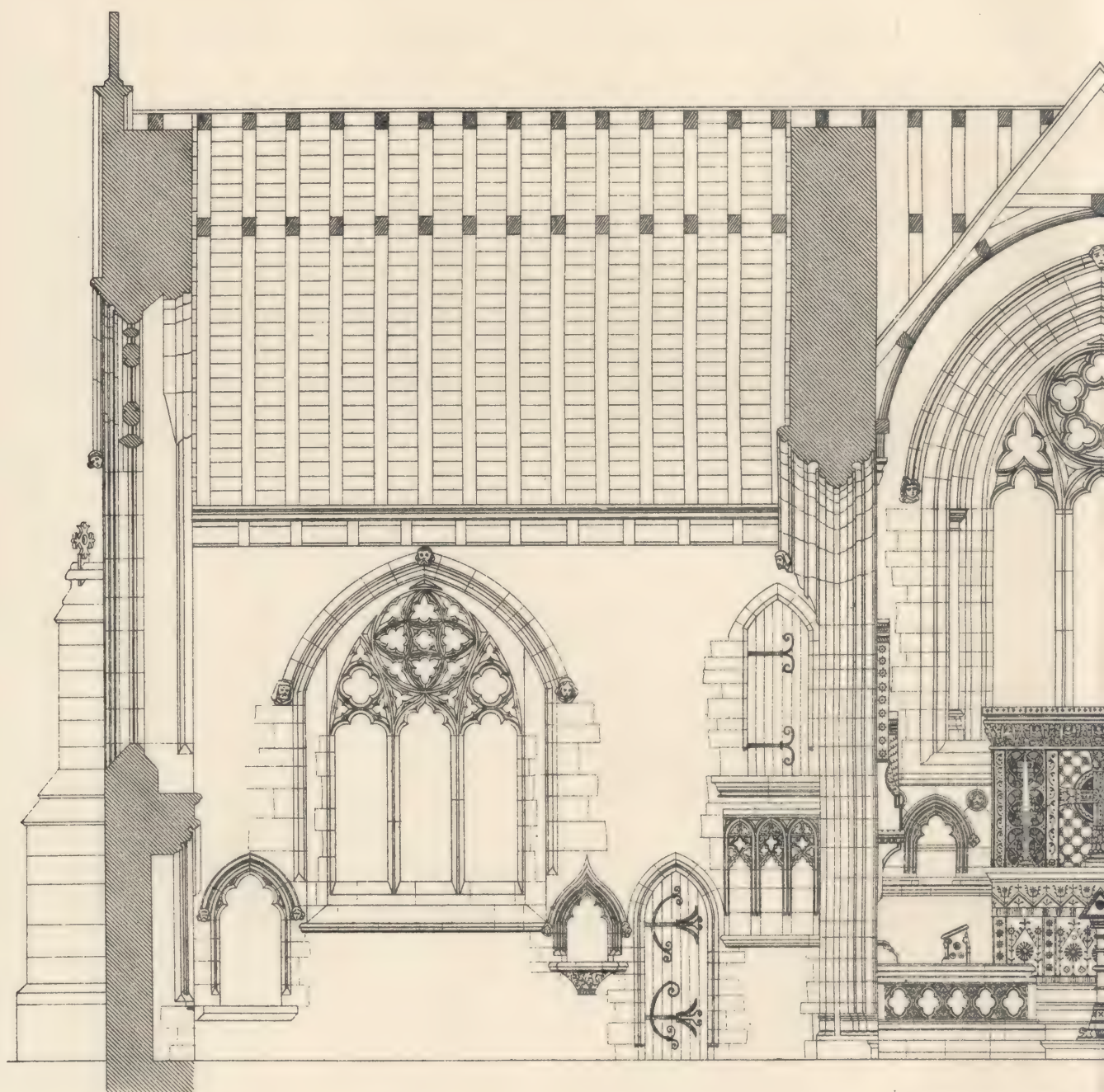
There is, for instance, the natural curiosity as to the architect of such a fabric, about which, I fear, I can say nothing. At the same time great works were going on at Exeter Cathedral, and though there is, of course, the general similarity of all such works, there is none of that special similarity by which it is almost always possible to detect the work of the same artist in different buildings. If, however, there is no connection with the work in the cathedral, there is a very considerable similarity to other works of the same age in the same county. I have already, some ten or twelve years ago, touched upon this subject in a Paper* read before the Exeter Diocesan Architectural Society, and of which I gave a copy to our Library. The illustrations of that Paper will enable you to see pretty clearly the points of similarity which are to be generally noticed in the fourteenth-century churches of Cornwall.

First of all I need not say here that the ground-plan is that part of a design in which we almost always find the greatest amount of individual, provincial, or national character. Every one knows the general type of the great churches in this country in the eleventh and twelfth centuries, and the complete revolution which it underwent in the following age. In France we know the ground-plans of Anjou and Poitou, of Périgord, of Auvergne, and of the Île-de-France. In Italy, in Germany, and in Spain, everywhere in short, we find a prevailing type of plan; each country presenting some peculiarity. Well, in Cornwall, I believe the common ground-plan in the thirteenth century to have been the simple nave and chancel which we had here at Penkevel in the early church; and, however this may be, it is at any rate certain that in the fourteenth century we have there a considerable number of cruciform churches, and, indeed, that almost all the churches of this age still remaining are simple cruciform churches without aisles, without chancel arches, and with western steeples. I may mention in illustration of this the plans of Tywardreath, Lanreath, St. Winnow, Talland, Pelynt, St. Ive, St. Cuthbert's, Sheviocke, and St. Mellion, all of them originally of the same age and same character as that of St. Michael-Penkevel in their original state, and these are some only among many. At a later date this cruciform plan was seldom, if ever, adopted, and instead of it we have almost always a plan consisting of nave and

* *Distinctive Features of the Middle-Pointed Churches of Cornwall* [with 12 illustrations]. By George Edmund Street, architect. Pamph. 4o. Exeter, 1850.



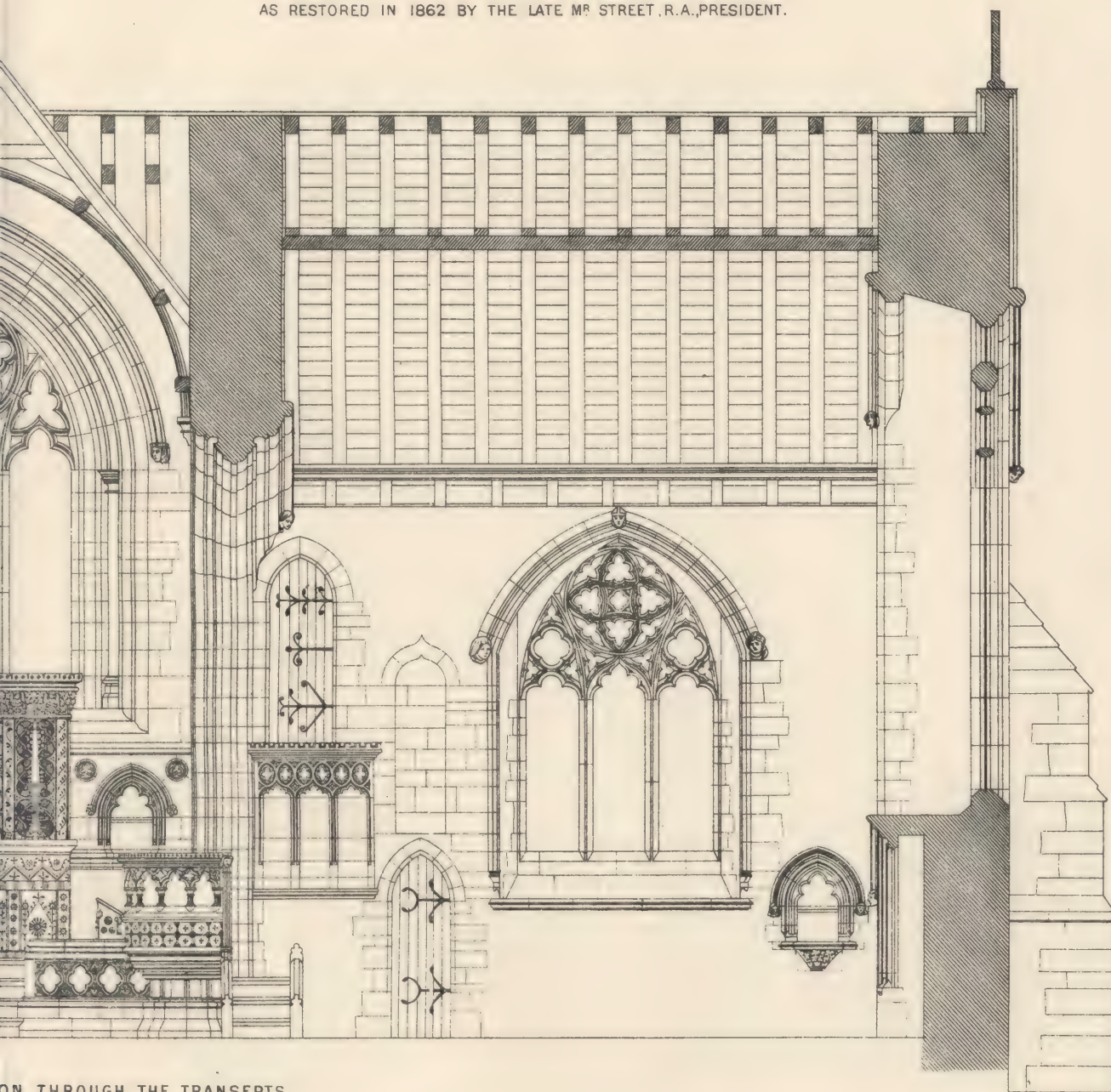




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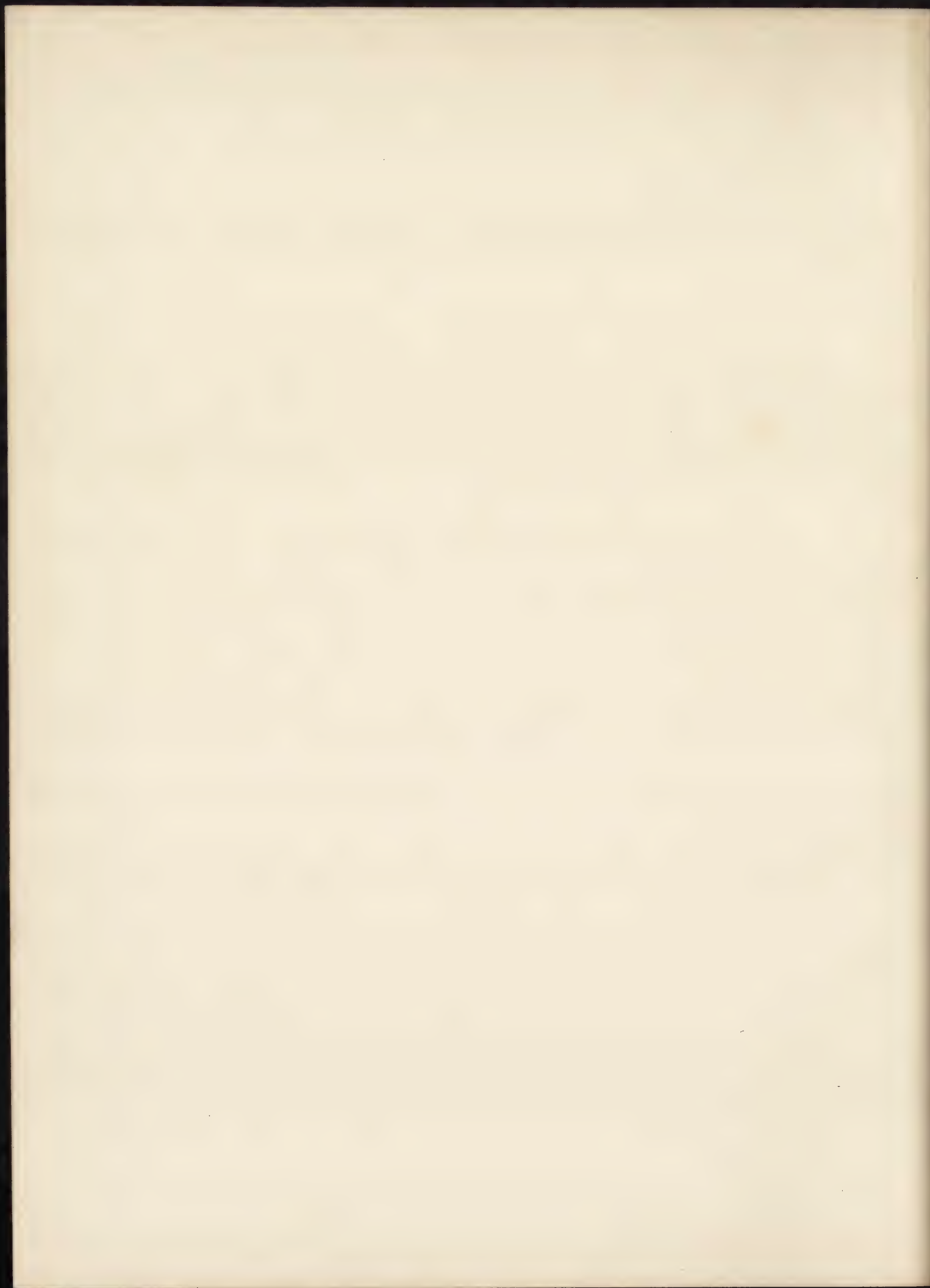
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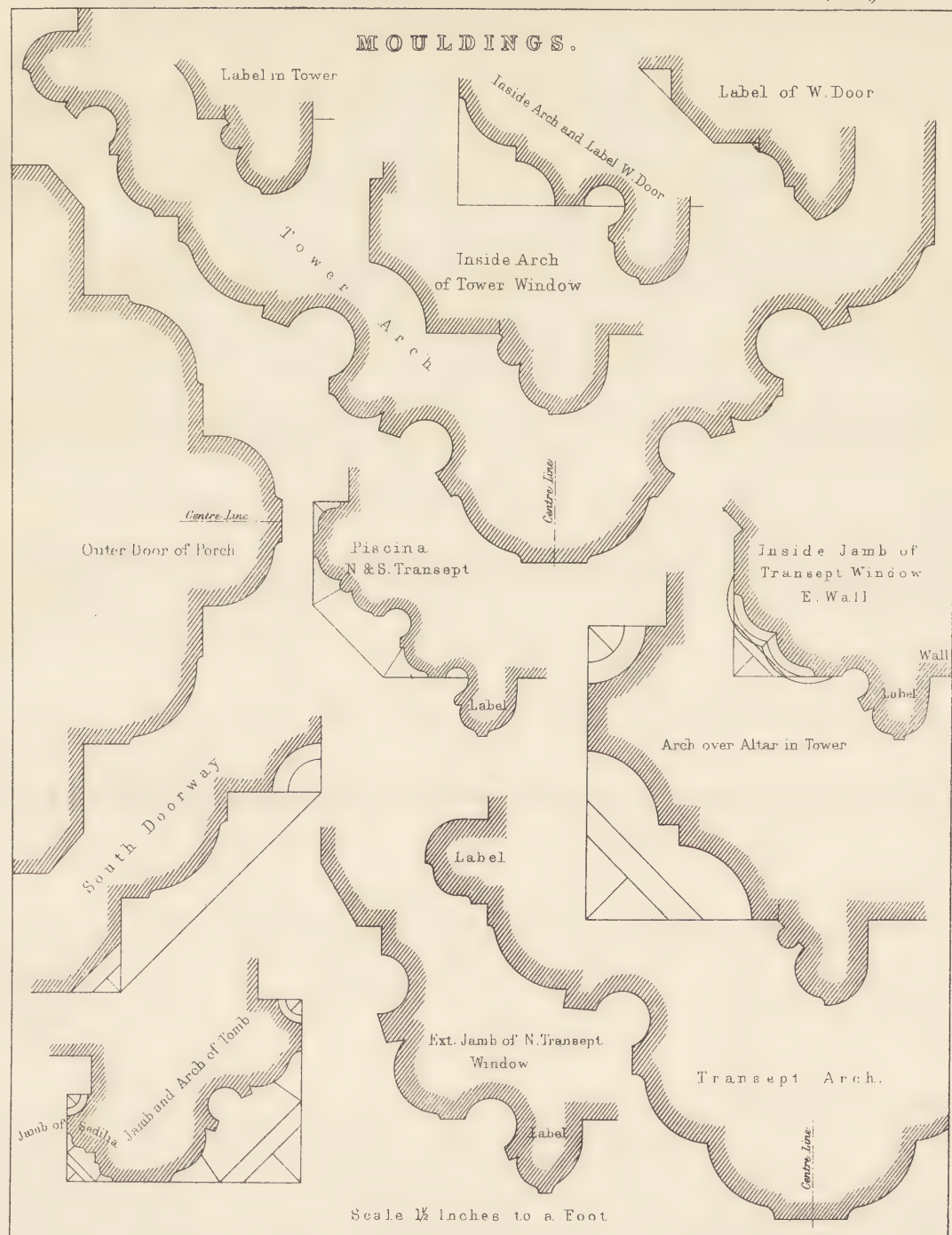
THE CHURCH OF S. MICHAEL- PENKEVEL, CORNWALL.
AS RESTORED IN 1862 BY THE LATE MR STREET, R.A., PRESIDENT.



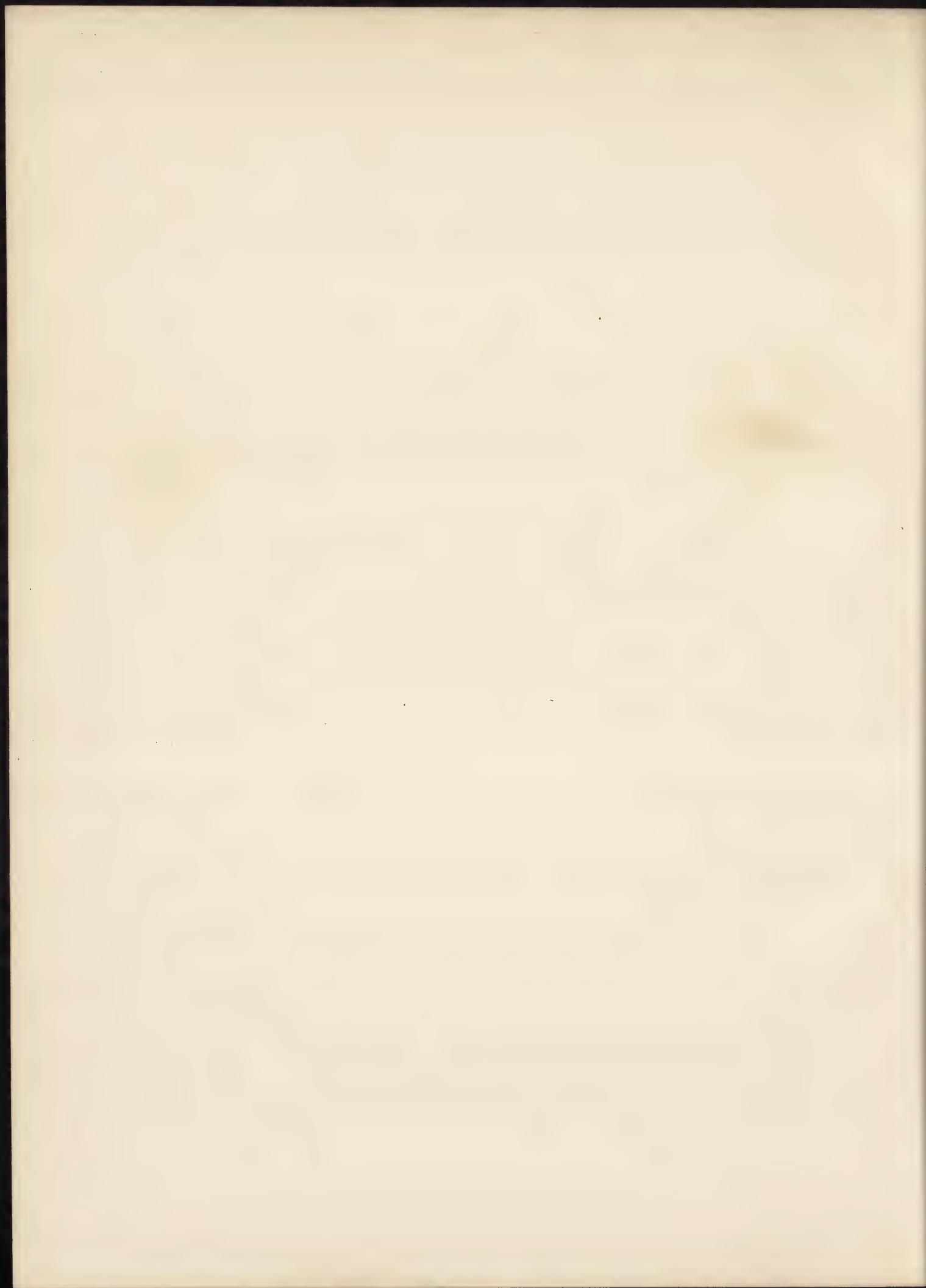
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THE CHURCH OF S. MICHAEL - PENKEVEL, CORNWALL.



aisles all of the same length, and with chancel and chancel aisles, divided only by the gorgeous wooden screens which were once so common in Cornwall. The detail follows the plans, and though there are variations of some kind, it is remarkable how in the case of window tracery the same leading lines are introduced into most of the Cornish windows of this age. The windows are mostly of three lights, with the monials continued on till they intersect the outer arch, and with the same curve. The spaces thus left are filled in with foliation of very similar character, and generally slightly ogee in some of its outlines. The rear arches at St. Michael-Penkevel are generally moulded, and the arch in the wall between the tracery and the rear arch filled in with stones, sloping from one arch to the other in an awkward fashion. The quoins and arches of the thirteenth-century chancel windows and buttresses, and of the remains of a window discovered in the north wall of the nave, were all of Killas, and not of wrought stone, and this I have observed in other Cornish works of the same age. The carved heads introduced as key-stones in this church do not, so far as I know, occur anywhere else in the county. The traceries naturally recall those of Exeter Cathedral, but I have seen none in Cornwall sufficiently like them to lead me to think that they were designed by the same hand. The Exeter traceries have their peculiarities, and these are not repeated in Cornwall; among them is the custom of stopping the labels on small corbels level with the capitals instead of on carved blocks above them, and the filling-in of the subordinate cusping in the eastern windows is in the choir decidedly earlier and better than these, and in the western windows decidedly later in character.

Several of the fourteenth-century churches have sedilia, of which I think there are no examples in the earlier and later churches. Here the arches of these are pointed segmental, and I ought to observe that the architect evidently had a great fancy for this form. The tower arch, the transept arch, the arch over the altar in the tower, the rear arches of the windows, the piscina, and the sedilia arches are all of the same shape, whilst the founders' tombs in the two transepts have segmental arches struck from one centre.

The mouldings in Cornish churches of this age generally consist of repetitions of the wave-moulds. Here, however, the main arches, and those of the sedilia, piscina, and recessed tombs are very richly moulded, and most of the labels have the common fourteenth-century feature of a hollow connecting them with the arches to which they belong. The sheet of mouldings will best explain their character [Illustn. xxxiii.]. Probably no church in the county has such rich and full mouldings as this, and fortunately most of them are well preserved. The mouldings are, in all cases, stopped with considerable care. The arches are continuous in every case save the tower arch, which, as I have said, has corbels. There is one other feature of similarity in this class of church which I must not forget: the piscina are often in the east instead of the south walls; here, as we have seen, there are three such, besides one of the sedilia. There are, too, several examples of founders' tombs in the end walls of the

transepts. The towers are generally at the west end, and the earlier examples have very simple pointed arches ; I know, however, no tower of the same character as this of St. Michael-Penkevel. The beautiful steeple at Lostwithiel—so unique both in its design and its mode of construction—presents some similarity to it in its traceries, but none in any other part ; and the steeple of St. Neots, which, after this, is the best example of the period, is certainly more like it, but not enough so to warrant their being attributed to the same architect.

In the materials made use of there was even more identity ; for it is very remarkable that, whereas the later churches in Cornwall, with few exceptions, are built of granite, or of the decomposed granite commonly called moor-stone, almost all the early churches were built with quoins and dressings either of sandstone, which occurs in small quantities in some parts of the county, or of elvan obtained from the quarry at Pentuan, or from several similar elvan dykes which traverse the granite and slate rocks of Cornwall in a direction from the north of east to the south of west. The quarry at Pentuan belongs to Lord Falmouth, and has now for some time been worked exclusively for this church ; the stone is quarried on the face of the cliff, and thrown down on to the beach, whence it is brought away by boats whenever the weather will admit. The quarryman always assures me that when he has broken his neck no one else will ever venture to quarry the Pentuan stone ; and as he quarried it for the first church I ever built—at Biscovey, in the same county—I can only tell him that I hope at least he will defer his catastrophe until after I have built my last. Portland stone seems to have been used to a considerable extent in the more delicate portions of the fourteenth-century work at St. Michael-Penkevel, but it has decayed everywhere ; and whereas much of the old Pentuan stone is fit for re-use, scarcely a fragment of the Portland admits of it. The body of the walls is built of Killas, an argillaceous slaty stone, which cleaves into thin flat stones, and makes a very good wall ; this was commonly used in church-work before the fifteenth century, and not so much afterwards.

The monuments contained in the church were not remarkable. There were two flat stones with crosses on them in the porch, which I hope to relay in the transepts. These were of the thirteenth century. Hals mentions two brasses which I cannot recollect to have seen ; one of a priest with the inscription, " Pray for the soule of Maister " John Trembras, Maister of Arts, & late parson of this church, whych decessyd the 13 " day of September, in the yeare of our Lord God 1515, on whose soule Jhu have " mercy ;" and in the south aisle (transept) another in armour in memory of John Trenowth, Esq., 1497. The modern monuments were numerous, and blocked up the most interesting parts of the church. Lord Falmouth has had them moved to the side walls at the west end of the church, where they do comparatively little harm. Among them is a monument to Admiral Boscawen, who, as his epitaph says, " died of " a fever at Hatchlands Park, Surrey, a seat he had just finished (at the expense of the " enemies of his country), and amidst the groans and tears of his beloved Cornishmen." Another to his wife is worth giving, on account of its ludicrous quotation from Boswell's

Life of Johnson. "Here lie the remains of the Hon. Frances Boscawen, daughter of "William Evelyn Granville, Esq. &c. &c. Her long and well spent life in the observance of the purest and most exemplary piety, and in the practice of every Christian "virtue, was terminated on the 26th day of February 1805, in the 86th year of her "age. She was endowed with an uncommon and remarkable strength of understanding, "and in society she is thus most truly described by a contemporary author :—* 'Her "manners are the most agreeable, and her conversation the best, of any lady with whom "I ever had the happiness to be acquainted.'" This lady, by the way, figures prominently in Mrs. Delany's recently published correspondence.

The account of the restoration of an old church would not be complete without some observations on the uses to which the building is to be applied, and the proposed mode of its adaptation for them. This is the more necessary because, in the first place, I cannot find that the subject has been ever yet properly brought before this Institute.

It is impossible, therefore, to go wholly and thoroughly into the question of Church Restoration without saying something as to the mode of fitting the restored building for the functions it has to perform; and I think that, as very many of us are now more or less engaged in the same work, it cannot be a waste of time if I point out here, as distinctly as possible, what this means, and what the Church of England requires at our hands for her service. Prejudices, it is true, have sometimes been excited on the subject, but this was in the earlier days of the architectural revival, and it is not at all too much to say, that at the present moment almost all parties in the Church are well disposed and prepared to accept those church arrangements which conform most to the letter and spirit of the Prayer Book; and that, in truth, it rests with us architects to make our restored churches fit for their purpose in the best sense of the word. It is in some degree, no doubt, a reproach to us, as a body, that in so many cases the arrangements proposed by the architect manifest a complete ignorance of the right use of the building; and I cannot understand why any one of us who undertakes such a work is not bound to study this part of his subject just as carefully as the architect of a house, a shop, or a theatre studies the special requirements of each of them before he pretends to make his plan. In the one case, as in the other, the business of the architect is to give advice, not merely to receive instructions; and it seems to me that when the welfare of souls depends, in no small degree, on the nature of his advice, it is all the more necessary that he should give it in the very best and most careful way. It is, indeed, I know, maintained by some that, in arranging the plan of a church, the architect's duty is solely to do what his client demands; but, even if this be so, in what way is the architect to act who is asked by his client (as I often am) simply to arrange his church in full accordance with the rules of the Church? or how is he to act if he receives no instructions at all? In either case he must act for himself, and ought

* Boswell's [1778, age 69] *Life of Johnson* (sic on monument).—G. E. S.

therefore, first of all, to have made up his mind clearly as to what will be required, and what his course will be. My own view is, that in any case he ought to propose what seems best to his own judgment, and leave with his client the responsibility of its rejection; and cases may, I think, often arise in which a high-principled artist must refuse to be a party to schemes, which are not only not his own, but which are also destructive to ecclesiastical or architectural propriety. In new works the shell of the building is the great work to be done; but in church restorations usually the work admits of little which one can call one's own. Old authority has to be followed, old stones to be reverently repaired and preserved, and after this the greatest scope for the genius of the architect is in the design of those minor accessories, which, mainly from ignorance of their lawfulness, are so often forgotten and omitted in our plans; and it is no little encouragement to us to find, what is undoubtedly the case, that the most correctly-arranged churches are also almost invariably those in which the greatest architectural skill of the day has been displayed. Nothing so much increases artistic power as the possession of zeal for, and interest in, the work at hand; and, as I now proceed to show, there is ample subject for both in the re-arrangement of an old church.

I shall begin at the church gate, and go from thence to the altar, shortly stating what seems to be required at all points; and, first, this very gate should be cared for. Here the corpse is to be met; and it should be amply wide therefore, and may well be covered with a canopy. In Cornwall the old lych-gates often remain; they are double, with a low wall between them on which the coffin is rested. To the right of the path from this gate to the porch is frequently to be found the base, or some portion, of the old churchyard-cross. This should be searched for, and, if possible, restored; it is a beautiful object, sanctifies the soil, and in this age of costly memorials it might often be introduced without difficulty. The porch should have low wicket-gates to keep out animals, and these should be simply latched, so that the church may be accessible to all for their private devotion. If there have been seats in the side walls they should be restored: nothing is nicer than the gathering of old church-goers in their porch before the service begins. The inner door should, if it hangs single, always hang to the western jamb, so that the altar may at once be seen on entering; but it is often very convenient to hang the doors of the main doorway folding, so that when opened they may not project beyond the thickness of the wall.

The first object inside the church is the font; the 81st canon requires it to be in the "antient usual place," and common usage agrees with this. But what we have to take care to provide is, that the font so placed should be fairly well seen, so as to allow of the public baptism of infants; it must have a drain and well under it, and there must be so much space left around as will allow parents and sponsors to kneel on the north, south, and west sides, with a step for the priest on the west side. Old fonts are usually so placed as to prevent any one kneeling on the east side, when their backs would be turned to the altar. If a new font has to be provided, its bowl

should be large enough for immersion. Generally speaking, however, the old font is to be spared and preserved, however rough it may be. Often when it is lost and dis-used it may be recovered; and, if it is not again possible to use it, it had better be buried below the new font, so as to avoid its desecration. In any case the font cover should be restored.

Here we must ordinarily see that the provision for bell-ringing is good; and we need never be afraid to suggest the ringing of the bells from the floor of the church where it is convenient to do so. The ringers are the more likely to remember where they are. The bier required for funerals when it exists may best be kept at the west end of the church, and when it does not, its restoration should be suggested. It should have a herse and herse cloth or pall; and, if space is valuable, I have seen it supported on iron brackets against the wall with good effect.

In arranging the seats there are several matters to be borne in mind: *e.g.* there must be a passage from east to west; there must be ample space about the door for funerals, and for the performance of the first part of the marriage service.* The central passage must be of good width, not less, if possible, than five feet. There must be ample space left between the seats and the chancel for (a) the Litany desk; (b) for the churching of women ordered by the Prayer Book (1549) "to kneel in some convenient place nigh unto the quire," and (1662) "as hath been accustomed or as the ordinary shall direct;" (c) for catechising; † and (d) for the pulpit. As to galleries, when they exist they should be removed, and every architect should resist strenuously their re-erection. Archbishop Laud's opinion is one in which we shall all agree. "The truth is," he says, "I did never like galleries in any church: they utterly deface the grave beauty and decency of those sacred places, and make them look more like a theatre than a church. Nor, in my judgment, do they make any great accommodation for the auditory; for in most places they hinder as much room beneath as they make above; rendering all, or most of all, those places useless by the noise and trampling of them which stand above in the galleries."‡

As to the seats, what is required is, first of all, that they should encourage rather than hinder kneeling, and be comfortable for sitting in. Three feet from back to front is necessary for this, a wide seat-board, a back which slopes very little, and, if possible, no panelling below the seat. Architects may do much to procure the right use of churches; and may well always recommend the revival of that good old custom, not by any means extinct yet in any part of England, but, sad to say, least seen where churches have been most restored: the division of men and women in church. My friend Mr. Ashpitel, it is true, in his Paper on Chancels [*Archæologia*, xxxvii. 130], doubts the antiquity of the custom. I can now only refer those who are inclined to agree with him to what Bingham says [book viii. chapter v. sect. 6], and to the

* "The persons to be married shall come into the body of the church."—RUBRIC, 1662.—G. E. S.

† Required by the Rubric to be done every Sunday at evensong in all parishes.—G. E. S.

‡ Archbp. Laud's troubles, &c., p. 96, quoted in *Hierurgia Anglicana*.—G. E. S.

fact I have mentioned already,* of the common prevalence of the custom in this country. In the arrangement of seats it is well, of course, if possible, to follow the old plan when it can be discovered; it is rarely, however, that this can be done, and where more seats have to be provided they should, as much as possible, all face one way (to the east), and this even in small cross churches, like that of St. Michael-Penkevel, where this arrangement leaves the old piscinæ, sedilia, &c., unobscured. The only furniture required outside the chancel is the Litany desk and the pulpit. Unfortunately the former is rarely used, yet one can hardly say why; the Litany is enjoined by the royal injunctions,† still in force, to be said or sung in the midst of the church at a low desk commonly (but erroneously) called the fald-stool. At the coronations of our Sovereigns the Litany is ordered "to be read by two Bishops, "kneeling at a fald-stool." In the plan of Bishop Andrewes's chapel the "fald story, "whereat they read the Litany," is marked; and in the Communion Service "the "place where they are accustomed to say the Litany" is mentioned; whilst the frontispiece of Sparrow's *Rationale of the Book of Common Prayer* shows it in use in the right place. Of the pulpit it is only necessary to say that it should not be very high, and that it ought to conceal as little as possible the altar or the chancel from the people. Its approach should be easy from the chancel, as it is necessary that it should be entered by the clergy coming from the altar or the stalls. Above the chancel arch the Commandments are to be painted. They are required to be at the east end of the church, *not* of the chancel; the two terms are always carefully used.

I now reach the part of the building as to which the greatest confusion exists in practice, whilst, nevertheless, the law is singularly plain, distinct, and concise. The direction in the Prayer Book is still our only and sufficient guide, and it is in the well-known words, "*The chancels shall remain as they have done in times past,*" which is followed by the direction "that such ornaments of the church shall be retained" "as were "in the second year of the reign of King Edward the Sixth." The chancels "in times "past" were divided from the nave by a screen, fitted with desks and seats, or stalls for a choir, raised by steps towards the east, fitted with other seats for the clergy near the altar, and with niches in their walls, which served as piscinæ and credences. The only question for us, therefore, is, whether the use of these arrangements was ever formally, or, indeed, in any way, abrogated before the second year of King Edward; and about this there can be no doubt. The rood-screen is undoubtedly legal; Bishop Cosin's gloss‡ on the words "in times past" is, "that is, distinguished from the body "of the church by a frame of open work." Bishop Beveridge [*Collected Works*, p. 24], in his well-known sermon at the Consecration of St. Peter's, Cornhill, defended the

* See also the direction in first Prayer Book of Edward VI. (1549) at time of communion, "the men on "the one side, and the women on the other side."—G. E. S.

† "The Priests, *with other of the quire*, shall kneel in the midst of the church and sing or say distinctly "the Litany." Queen Elizabeth's Injunctions.—G. E. S.

‡ Bishop Cosin's Notes in Nicholls's *Commentary*, p. 15.—G. E. S.

erection of one there by Sir Christopher Wren. The judicious Hooker defends them [*Ecclesiastical Polity*, v. 14]. There was one in St. Giles-in-the-Fields Church, given by the Duchess of Dudley, *temp.* Charles I.; and they are not only to be seen in many of the City churches, but also in a number of churches throughout the country of post-Reformation date. Bishop Montague [*Visitation Articles*, p. 42] required them in 1638, and pointed out, among their uses, the keeping dogs out of the chancel. Any one who has heard the dogs barking about Spanish churches will see the value of the protection where it is customary to take dogs into church; and my friend Mr. Scott, I remember, in one of his books, advocated altar rails on the same ground, though I am bound to say that, where I have seen his altar rails, the dogs must be very well behaved and moral dogs, if they are deterred by them from going through or over them! Queen Elizabeth's injunctions on the subject were, that the lofts only should be removed, "a convenient crest" to be put "on the beam" in place of them, and "the seats in the quire to be left as heretofore hath been used."

Of the chancel seats I need say but little. They should, if possible, be restored; or at any rate be arranged on the usual old plan, with the addition of a second seat and desk, below the others, on each side for the boys, of whom the bulk of our choirs are composed, the clergy and men sitting in the back seats or stalls. It is rare to find these subsellæ in old parish quires. In nineteen churches out of twenty the best place in every way for the clergy is the western seat in the chancel on either side. Yet, perhaps, in nineteen churches out of twenty a useless reading-desk is erected, at considerable expense, in the nave. For this, as a rule, architects, and architects only, are responsible. They either do not know, or do not care about the matter. Yet a "reading pew" is but once mentioned in the Communion Service of the Prayer Book, and then as a convertible term with pulpit,* and writers like Hooker, Wheatley, and others, speak of it as a desk facing east, not west, when it was used. The advantages of the use of the chancel seats for the purpose are, that the clergy are then able to take their part properly with the choir; that when there is more than one priest the service may be divided between them, to the great gain of their throats; and finally, that it looks better, and is more in accordance with the Prayer Book than any other use. The stalls should not exceed one-third of the length of the chancel. It does of course sometimes occur that the plan of the church seems to prevent the proper use of the chancel by the clergy and choir. Some years ago, in restoring the fine old church at Wantage, I had what appeared to be such a case. Accordingly, though the old stalls remained in the chancel, I was induced to put some light desks and seats under the central tower for the clergy and choir. Here they sang for some two or three years, and then, again trying the old arrangement, found that after all the quire was the best place for the service. The same thing has happened in the very similar church at Lambourne, and in both the

* See on this point the remarks of the Editors of *Hierurgia Anglicana*, p. 42.—G. E. S.

piers of the central tower are very heavy, and the tower arches low and narrow. Our forefathers got over the difficulty by having the stalls in the quire, and the rood-loft on the west side of the tower, so that the parts of the service like the epistle and gospel and the sermon, which people most required to hear every word of, were read in the midst of them. Between the stalls may be a lectern for the Bible: this is better double than single.* Here, too, if possible, should be the organ, as near as possible to the choir, and with the keys so placed that the organist may be able to communicate with and direct the choristers. East of the stalls there should be ample space between them and the altar rail or step for communicants, and again as much space as possible between the altar rail and the altar. The sedilia are still the best kind of seat for their place, and take up less room than chairs. One chair for the bishop against the north wall seems indeed to be required when he is present. The piscina or drain may well be restored, to be used for washing the chalice and paten (though this may be done—but not so well—in a vestry piscina), and one of the niches so often found in the walls may be made use of for a credence, or table of prothesis.† As to the altar, it is seldom that anything is found to be restored, save the old altar stones, which in all cases should be taken care of and re-used, or at any rate no longer be allowed to lie where they can be trodden over in the floor. As far as possible new altars should be as large in all respects as the old: they then look dignified. If the altar is raised on a foot-pace it should be amply wide in front, projecting about two feet six inches west of the altar. The altar must be covered with a cloth: this may be embroidered in the ancient fashion, or may be of the most costly material. The Queen at her coronation—the most solemn moment of her life—offered on the altar at Westminster Abbey a pall of cloth of gold.‡ Old illuminations, and the remains still left, enable us to restore this part of the church and its furniture without difficulty.

An old vestry is comparatively rare, and care should be taken to fit it up properly. Presses are required for the surplices, and for the altar cloths and linen, and a safe for the altar vessels. An external door, moreover, is a great convenience.

Finally, from beginning to end of his work, the true church-architect's thought must be not how he may make the prettiest work, but how, first of all, he can make the most religiously impressive work fit in all respects for its purpose; and secondly, how he can best, consistently with the other condition, make his work a thorough development and exhibition of the old work. To this end the great fact that the Church of England is that most conservative body in Christendom who puts on the forefront of all her services that "the chancels shall remain as in times past," is the greatest aid and assistance; for if architects are allowed to work in simple obedience to this rule they have no difficulties to contend with, which may not most easily be

* "He that readeth so standing and *turning himself* as he may best be heard of all such as are present."
—RUBRIC, 1662 and 1554.—G. E. S.

† In the absence of an old niche a new one ought of course to be provided.—G. E. S.

‡ The Coronation Service. Maskell's *Mon. Rit. Ecc. Ang.*, iii. 88.—G. E. S.

surmounted. It is true that this can only be done by thorough devotion to the work on the part of the architect; for no building which requires much skill for its complete rehabilitation can be taken in hand with justice by any architect whose time is not free enough, or whose enthusiasm is not warm enough, to lead him personally to manage the whole work.

So far, I have spoken only of the course to be pursued in the restoration of an old English church; and I will say a few words only by way of directing attention to the equally important question of our post-Reformation churches. No doubt in arranging them for our service there is no example at once so apt and so venerable as that afforded by San-Clemente at Rome. In Mr. Ashpitel's words, "There is a choir formed here by an enclosure or wall of marble about four feet high, carved with crosses and emblems, and enclosing two ambones or pulpits, one for reading the gospels and preaching, the other for reading the epistles." "In this enclosure the chorus sat, and sang the psalms, hymns, and doxologies." St. Pancras, and other churches of its class, so arranged might really remind the worshippers a little of their purpose; their altars would not of necessity be against the east wall: * in an apse, the right place is under the chord of the apse, and in such a position they might well be placed under baldachins, as Sir Christopher Wren, I think, proposed at St. Paul's. Nothing, indeed, astonishes me more than the indolence which has hitherto been shown in regard to the proper restoration and rearrangement of our classic and Italianised post-Reformation churches.† Nothing is more unwise than to allow any one any pretence for saying that a restored church is less comfortable than an unrestored one; but this needs no enforcing here.

I must now conclude. I feel that I owe you some apology for having detained you at all upon a part of the subject which at first sight might not appear to be one which you would be called on to consider. I found, however, that my subject naturally led up to this question of church arrangement, and could not well be treated without reference to it. I have endeavoured to confine my propositions to points which appear to be clearly ruled and decided for us. This, it may be said, is a work of supererogation; and so it is, I am aware, to very many of you, who do not require to be informed at all by me on the subject. On the other hand, there are others to whom I have no doubt whatever the ventilation of the question, and the direction thus given to one very necessary line of study, will not be without benefit. For some years now I have had to examine officially a great number of plans for churches; and though a large number have been in all respects beyond my criticism, there have been, unfortunately, so many which showed a complete blindness to all the necessities of an English Church service, that I know in directing attention to the subject in a plain

* The altars at Arundel, Stone, and Warfield are examples, amongst others, of the fact that the altar did not always stand against the east wall in a square-ended chancel.--G. E. S.

† See [TRANSACTIONS, 1869-70, pp. 130-143] a Paper on "The Desirability of Restoring Churches of the 'Italian Style of Architecture,'" read by the Rev. E. L. Cutts, some seven years after these words were published; and the Discussion which followed.

practical way I must be doing good. And there seems to me to be a special appropriateness in the choice of the present time for the remarks I have made. We are now, at this Institute, offering the Soane Medallion to the "best design for a church "to hold fifteen hundred worshippers." The word "church" will doubtless be interpreted in the broadest way; but it is to be hoped that competitors in such a case will endeavour to realise to themselves a church in which some special kind of religious service is to be carried on, and not a visionary comprehensive establishment, to receive every kind of worshipper, and suit none!

To any of my hearers who neither have churches to restore, nor any concern for the services of the Church of England, I can only repeat my apologies for having forced them to listen to my observations. To us who are now so actively engaged in this good kind of work, no detail of church arrangement, no enquiry into church history is without its interest. We see in them the germ of all that symbolical and truthful teaching which does so much to make many of us most earnest disciples of our national and truly Christian art.—GEORGE EDMUND STREET.

[3.]

ENGLISH WOODWORK IN THE XIII. AND XIV. CENTURIES.*

[The late Professor Donaldson, *President*, occupied the Chair.]

MR. PRESIDENT AND GENTLEMEN,—

I PROPOSE to ask your attention whilst I attempt to give some slight account of the work of the English Carpenters before the end of the fourteenth century; and this not because I suppose myself to be in possession of any exclusive information on the subject, but because unfortunately it has always been by far too much the fashion to illustrate and describe the woodwork of the fifteenth and sixteenth centuries only, just as though none remained of earlier date. So much, indeed, has this been the case that I may venture to say that there are many of our modern buildings in which the detail of the stonework shows a fair acquaintance with Early-Pointed stonework, while the detail of the woodwork appears to show an almost absolute ignorance of early woodwork. Yet, as I hope to show, the remains of woodwork of the thirteenth and fourteenth centuries are still so numerous and so varied, as to afford ample subject for our study and ample authority for our guidance.

The most valuable work on the roofs of the Middle Ages which we possess is probably that of Messrs. Brandon; but when I say that, with the exception of the roof of St. Martin's, Leicester, the aisle roof of Haslingfield, and two or three trussed rafter-

* The original Paper, which has been slightly condensed, was read on 20th February 1865. It will be found in the First Series of TRANSACTIONS, 1864-65, pp. 85-102.

roofs, there are none selected for illustration of the date to which I limit myself to-night, it will be seen that the field is open to me. For the study of the later roofs, Messrs. Brandon's book and the publications of the elder Pugin are good and sufficient guides, though not more than guides, for the final study of the architect ought always to be the roofs themselves. The valuable works of our Librarian Mr. Dollman, on the Domestic Architecture of the Middle Ages, contain some good examples of early woodwork drawn with his usual care; and Messrs. Brandons' *Analysis of Gothic Architecture* contains, if I remember right, several details of the same kind. But I have preferred, in the notes which I am now offering, to confine myself to my own notes of ancient examples. Such a subject as mine would be one of special interest to us as Englishmen, even if our consideration were not limited to the examination of English examples and systems; for if there is one feature which, above others, distinguishes the earlier architects of this country from those of others, it is that they were skilled beyond all others in the science and practice of carpentry. Whether it was that they were surrounded on all sides by the ocean, and that from the first, therefore, naval architecture must have had a certain influence upon them; or whether it was because they had the good fortune to possess ready to their hands, and in the greatest abundance, some of the best of European timber, certain it is, that the buildings they erected are more remarkable for the beauty and variety of their wooden roofs than are those of any other race of architects in the world. And whereas in France, Spain, and Germany, few architects ever thought of anything but a stone roof as the proper finish to the interior of their buildings of any architectural pretensions, our old English architects had no such feeling, and erected in all parts of the country these monuments of their skill, often magnificent in their effect, gradually becoming scientific in their construction as time wore on and experience taught them true principles, and still enduring in such numbers as to astonish us when we think of the perishable nature of their materials, and the neglect with which they have so often been treated by their guardians during the last three hundred years. In short, just as we must give the palm to other countries when we examine the history of groined roofs executed in stone, so is it certain that we have had no worthy competitors in the science of building and ornamenting timber roofs.*

It is not impossible that our ancestors persevered in their peculiarity, when once it was established, very much because it *was* a peculiarity. Our insular pride is of no new birth, and was as strong and decided five hundred years ago as it is now. Our architects persisted at that time in the adoption of the square east end for their churches, when the apse was almost universally in use by the architects of the whole of the rest of Europe; and with a similar feeling they may have resolved on the use of open timber roofs in preference to the more usual stone roofs of their Continental contemporaries; besides which, the difficulty experienced in England in obtaining

* Compare Viollet-le-Duc [*Dictionnaire*, iii. 35, article "Charpente"] :—"Mais si nous voulons voir des charpentes apparentes . . . il faut aller en Angleterre."

good building-stone in some districts, may have conduced to the same result. But, however this was, their practice ministered no doubt in a far greater degree to the love of variety, for which they were conspicuous, than the other practice would have done. There is no greater limitation to an architect who loves variety of outline, plan, and effect, than the obligation always to cover his building with a stone groined roof; for the varieties of which it is susceptible are but few, the elements of its construction always the same, and the resulting forms and positions of buttresses and points of support also very similar. One of the consequences, therefore, of the general absence of stone vaults in our old buildings is that they are more full of irregularities in their plans, of variety in their designs, and of invention in all their parts, than those of any other nation: and we may be well satisfied to put up with an occasional loss of grandeur, if it thus involves so great a gain of loveliness and interest.

Of woodwork executed before the end of the twelfth century we have either very few or no examples in this country. The probability is that it did not differ very much in its character in the tenth, eleventh, and twelfth centuries; and, as far as we can ascertain from the representations of buildings in illuminated manuscripts, this seems to be the case. The drawings of woodwork in some of these works, as, *e.g.*, the Benedictional of St. Ethelwold (tenth century), prove that carving and moulding, if not turning of wood, were commonly practised; but as to the architectural character of the work so executed it is impossible to judge with any exactitude. In these illuminations we constantly see articles of furniture (such as chairs) represented with great minuteness, and the exteriors of buildings with turrets, and roofs of moderate pitch; but of their structure or detail, especially in the interior, it is difficult to speak at all positively. It is probable, however, that the roofs which appear to have been used in our Norman buildings were, to some extent, the same as, or reproductions of, those which the Saxons used. They consisted of the simplest elements, either of rafters placed against each other, and resting upon plates connected with rude tie-beams, or, where the scale of the building required it, of rafters trussed and framed together in the way which we see to the present day in such examples as the roof of the nave of Ely Cathedral. There can be little doubt, too, that our Saxon churches were, as a general rule, of small dimensions, and that some of them were constructed entirely of timber, and were very rude and simple in their architectural character. It is not unlikely that whatever architectural enrichment was applied to the Saxon roofs and woodwork generally, was derived in some degree, if not directly, from Rome; for the connection of the clergy with the Roman Church would render this in a high degree likely, and, as Professor Willis has shown in his history of Canterbury Cathedral, the Saxon cathedral there was in some sort a copy of the Old Basilica of St. Peter, whilst the influence exerted by the monks of Canterbury would act largely upon their brethren in other parts of the country. The account of the burning of Canterbury Cathedral in A.D. 1174, given by Gervase, may perhaps be quoted with advantage, as bearing incidental evidence to the construction of one of our most important churches. Three cottages having caught fire, the sparks were "driven by the wind between the joints of the lead," "and set fire to the

"rotten rafters; from these the fire was communicated to the larger beams and their braces, no one yet perceiving and helping. *For the well-painted ceiling below,* and the sheet lead covering above, concealed the fire that had arisen within." "And now that the fire had loosened the beams *from the pegs that bound them together*, the half-burnt timbers fell into the choir below upon the seats of the monks; the seats, consisting of a great mass of woodwork, caught fire; and thus the mischief grew worse and worse. And it was marvellous, though sad, to behold how that glorious choir itself fed and assisted the fire that was destroying it."*

Here we have a description of a church with a steep roof and a boarded ceiling under it; and, with the example of the nave roof of Peterborough Cathedral still before us, we need have no difficulty in understanding the nature of its design. The painted decorations of the ceiling at Peterborough, strangely as they have been altered in the last century, still retain enough of their original design to leave no room for doubt that the whole foundation of the work is Romanesque, and about coeval with the fabric of the cathedral; and probably the grand open timber roof of Ely Cathedral is not much later in date. Woodwork with any marks of Norman sculpture or carving on it is very rare, though there is a tie-beam in the roof of Old Shoreham Church, which has the billet-moulding carved on it. As an example of woodwork of the period of transition from Norman to First-Pointed the screen at Compton, in Surrey, is one of the most characteristic remains. The details of the carving and of the moulding are alike good. This screen remains in its old position, forming the front rail to the floor of an upper chapel contrived over the groined roof of the chancel, and appears to be coeval with the church.

It is with the introduction of Pointed architecture that the main interest of this subject commences; and from the beginning of the thirteenth down to the end of the fourteenth century, the multitude of examples of every kind of workmanship in wood is the only real difficulty with which I have to contend in such an essay as this.

The subject will divide itself naturally under several heads: First, the use of wood in construction—in roofs, spires, and turrets, houses and barns, ceilings, floors and groining, porches, lych-gates, doors, and windows, bell-wheels and carriages, palings, scaffolding, and various other works; and, secondly, the use of wood for furniture, more particularly for that used for ecclesiastical purposes—as, *e.g.* screens, seats, and stalls, pulpits, font covers, lecterns, sedilia, chests and presses, and the like—besides which there are other uses of wood which I need only just mention, as, *e.g.* the use of wood when not intended to be seen, as for receiving plates of metal, for book-covers, for pictures, for utensils of various kinds, for all kinds of domestic furniture, as well as its use for covering roofs, for naval and other purposes, which it will not be possible to say anything about to-night.

Beginning then with the use of wood for roofing. It is well to remark, first of all, that the varieties in construction of old roofs depended to some extent on the

* Professor Willis's *Canterbury Cathedral*, pp. 32 *et seq.*—G. E. S.

fashion which had been set, either by the abundance of material, or by some one bishop or architect in particular dioceses or districts. It is easy to mark out certain general divisions on the map of England, within the limits of which a remarkable similarity is apparent in the woodwork as well as in the stonework, as, *e.g.*, the hammer-beam roofs of the Eastern Counties; the trussed rafter-roofs of Kent and Sussex; the waggon-shaped roofs of the Western Counties, the work one might suppose, from internal evidence, of people living on the sea-board. But, besides this, we find that our old architects were constantly varying their designs, with the object of improving the construction of their roofs, and very often with a view to dispensing with the horizontal tie-beam, which in many cases was evidently felt to be an eyesore.

The earliest roofs of which examples exist have generally tie-beams, connecting the plates, and all the rafters framed together so as to show from below five canted sides (Old Shoreham Church and St. Mary's Hospital, Chichester), or else with the braces below the collars curved so as to make the internal roof circular or pointed-arched, instead of polygonal in its section. The object of all this trussing or bracing—whether rectilinear or curvilinear—was evidently, first, to tie each pair of rafters together, and secondly, to stiffen them sufficiently at various points in their length to enable them to support the weight of their covering, and to resist the force of the wind. The simplest form of trussed rafter-roof has rafters, collar-rafters, and ashlar-pieces between the wall-plates and the rafters; the next form has diagonal braces passing from the lower part of the rafter on one side across the collar to the upper part of the opposite rafter; and the most finished form has, in lieu of these straight braces below the collar, curved braces, which, giving a series of arches, one beyond the other, produce always a very charming effect. These roofs are so important and so numerous that you must allow me to describe one or two of them somewhat at length. First of all let us look at the roof of Salisbury Cathedral—a work never intended to be seen, but yet constructed so honestly and well, that, were it necessary to show it, there is nothing in its appearance of which the constructor need be ashamed. This roof is of very steep pitch, and has all its rafters framed together, and has tie-beams only 6 ft. 6 in. apart. There are outer and inner wall-plates, and these are connected in a very secure way to the tie-beam by means of diagonal ties or dragon-pieces crossing them and fastened to the tie-beam. In the fourteenth century I think this roof gave way to some extent, and then two chamfered posts—queen-posts I suppose I ought to call them—were added between the collars and the ties, and purlines supported by trusses from the plates were also added. With these additions the roof seems fitted to last for ages. The rafters here are $6\frac{1}{2}$ in. and as much as 1 ft. 6 in. to 1 ft. 8 in. apart. The number of ties in this roof may, no doubt, be accounted for by the necessity of tying the walls together above the groining. There are no flying-buttresses above the triforium roofs, and though the groining is, I believe, constructed with light calcareous tufa, its weight and thrust must still be felt.

The somewhat similar roofs at Wells and Exeter may be dismissed in a few words. At Wells, the roof over the transept is rather light, having no tie-beams, and curved

braces to only every third pair of rafters ; but the roof over the nave is like that of Salisbury, a forest of timber and of very striking effect. Just as at Salisbury, while the tie-beams again are placed at very short intervals, the flying-buttresses are omitted. Usually these trussed rafter-roofs are simpler in design than the examples just described, and consist only of a pair of rafters tied by a collar-rafter, with diagonal braces between the collar and the rafter, and upright ashlar-pieces between the latter and the plate. This is, perhaps, the commonest form of old English roofs, and a few words are here necessary as to the way in which they have endured the test of age. First of all, however, let me say that, in the presence of carpenters' work six hundred years old, I speak with reverence. Very many of these old roofs still stand, but little the worse for age or wear. They have suffered much by neglect, and the admission of damp and wet to the feet of the rafters and the plates ; this has often ended in their destruction. They have also suffered, when their span is great, from the weakness of their construction in one part. The timbers were mortised and tenoned, and pinned with oak pins ; and every one who has examined many of them will be aware that in very many cases the pins have been broken short off, whilst in others the rafters have broken between the collar and the plate, and in both cases the plates have been pushed outwards. If this has happened in roofs constructed with nothing but the best oak timber, and with very heavy scantlings, I leave you to draw your own conclusions as to what is likely to happen to the pretended copies of these roofs erected at the present day on all sides, with rafters of weak fir, and scantlings $2\frac{1}{2}$ by 4, instead of 6 by 4 or 6 by 6, as we find them in the old work. My belief is firm that few of these copies will last fifty years, and certainly none will last six hundred. The somewhat similar roofs in which the rafters are all framed together, but in which curved braces are framed to the underside of each pair, are so similar in principle that I need do no more than refer to them in passing. Many of these roofs are extremely ornamental in their effect, and some of them have the curved braces moulded at intervals, so as to take away from their otherwise somewhat monotonous effect.

Examples of each of these forms of roof are frequently met with in which the construction has been enormously strengthened by the addition of a tie-beam ; and where the outside covering has been fairly attended to, this form of roof still stands as well as when first erected, and may almost be said to be capable of lasting for ever. Objections have been made to tie-beams, but some of our finest old roofs have them ; and it may be safely asserted that we shall *always* be well advised not to ignore the direct tie. The forms of tie-beam roofs commenced with the simple insertion of a beam from plate to plate. It was at once found that this was weak and liable to sag in the centre, and it was strengthened by the addition of a king-post. This form of roof was possibly derived from the French, and at any rate it is one from which their architects departed but seldom for three hundred years. It is very effective when, as is usually the case, the king-post is treated as a shaft with moulded capital, band, and base, and the tie-beam is moulded on its underside, as in the example of Old Shoreham, where the dog-tooth is introduced in the centre of a bold arrangement of mouldings.

It was soon found, however, that roofs of this kind required further support. The tie-beams held the plates together, but there was no provision for any longitudinal tie, each pair of rafters being separate from the next. This defect was at once remedied by the insertion of a longitudinal timber above the king-post, supported by curved braces, tenoned and pinned into both it and the king-post. The king-post was still generally treated as a shaft (either circular, octagonal, or square) with moulded capital and base, and curved braces were also generally introduced, connecting it with the canted braces between the collars and the rafters, or with the collars. In all these examples there is no principal rafter or truss properly so called. The king-post was inserted in the first place to preserve the tie-beam from sagging, and the latter was adopted only with a view to tying the plates together, and affording a firm footing for the feet of the common rafters. Each pair of common rafters, framed and strutted, was complete in itself, and had no dependence upon any other portion of the roof, save the plate, until the introduction of the longitudinal timber under the collar-rafters, of which mention has just been made. This addition to the roof, whilst it tended to bind the whole of the timbers together, and was undoubtedly an improved construction, was, however, found to involve another difficulty ; for, as it threw a great part of the weight of the roof on the tie-beam, this had a tendency to sink under it. This led to the insertion of a brace under the tie-beam, tenoned at one end into it, and at the other end into a piece of timber resting on a stone corbel, and placed vertically against the wall under the end of the tie-beam. The roofs at Hatfield, in the porch at Facombe, and that in the old hall at East Meon, exhibit this arrangement very distinctly. The arrangement of the feet of the rafters in these roofs is worthy of remark. The ashlar-pieces and the rafters are usually framed together with cross-pieces, forming a triangular base for each rafter. Sometimes this cross-piece is mortised on to a central plate, whilst in other cases there are two wall-plates, and in many the cross-piece is omitted. At Prestbury, in Gloucestershire, the outer rafter-foot is most ingeniously let into a groove in the plate ; and at Salisbury the cross-pieces show the mortising for the tenons of the ashlar-pieces in their face. Where there is an inside plate it is usually moulded, and a good example of a plate to a roof of this age was, and I hope still is, to be seen on the roof of Heston Church.

There are numerous other varieties of tie-beam roofs which must now be described. The roof still preserved on the barn at Easby Abbey is very noticeable. Here, in place of the framed common rafters, we have purlines resting upon a principal rafter, extending from the tie-beam to the collar. One of the purlines is strengthened by a brace on its underside, and there is a king-post above the collar. This roof is probably of the thirteenth century, and one of the earliest examples of a principal truss taking the whole weight of the roof, which, at a later date, became the most usual, as it was the most scientific, mode of construction. The roof of Polebrooke Church dates also from the early part of the thirteenth century. The principal rafter here is a great cusped piece of timber ; and it is worthy of notice in how much of the early woodwork we find a partiality for this large, simple, and very effective cusping.

The roofs of Adderbury Church, of Twyford, Bucks, of the old vicarage at Wantage, the Guesten Hall, Worcester, the destroyed Refectory at Malvern, and Baggiley Hall, Cheshire, all works of the fourteenth century, afford sufficient evidence of this partiality. Some of these early examples are remarkable also for their flat pitch, and a few words must be said upon this point. As a rule the pitch of the thirteenth-century roofs was undoubtedly rather steep than flat, but there are many examples in which the contrary is the case. The roofs at Polebrooke, St. Martin's Leicester, Sparsholt, Kiddington, and Adderbury were all of them erected before A.D. 1350, and are of flat pitch. In Northamptonshire these flat early roofs were very commonly adopted on clerestories, as *e.g.* in the remarkable thirteenth-century church at Warmington. In the Leicester, Kiddington, and Sparsholt examples, the tie-beam is cut out of very large timber, and sloped on its upper side to the pitch of roof, so that the ridge and purlines rest directly on it; and in order to support the enormous weight thus thrown upon the tie, a grand arch of timber is constructed on the underside, springing from stone corbels firmly built into the wall. Few examples of this kind of roof are more striking than that at Sparsholt, where the spandrels between the arch, the tie, and the wall-piece, are filled in with elaborate traceries. In the Polebrooke, Oundle, and Adderbury examples, upright posts support the ridges, which are further strengthened by braces to support the great weight which in a flat roof is thrown upon the ridge. At a later date, this construction was very common.

Mention has been made of king-post roofs as among the earliest developments that we have. The queen-post roof was a much later construction, and is of comparatively rare occurrence in old English examples. The barn at East Barsham, the church at North Walsham, and the late church at Henley in Arden, afford examples of the mode in which this kind of construction was applied. The North Walsham roof is of peculiar interest, owing to the very adroit way in which the tie-beams of the aisles are passed through the walls, so as to afford a means of tying the nave and aisle roofs together in the most secure manner; and I may mention here, for the sake of comparison, the interior of a magnificent barn at Harmondsworth, in which the mode of construction is identically the same, the great upright posts in this example taking the place of the stone columns and arches of the other. The Harmondsworth barn, which may date either from the fourteenth or the fifteenth century, may also be compared with the principal truss at Baggiley, and one of the trusses at Sutton Courtney, in both of which the construction is very nearly the same, the roofs being essentially tie-beam roofs, though not obviously so. To the examples that have been given of queen-post roofs let me add one more—that of the kitchen in the Bishop's Palace at Chichester—and we shall at once see how our ancestors arrived at their most remarkable development, the construction of hammer-beam roofs.

The roof of Westminster Hall (A.D. 1397) is one of the earliest, as it is undoubtedly the most magnificent, example of this kind of roof. Here the great curved brace which rises from the corbel at the foot of the wall-piece to the collar, binds the whole work together in so firm a manner as to make it all but impossible that there should be any

considerable lateral thrust ; and in this it aids very sensibly the triangular construction formed by the hammer-beam, the queen-post, and the principal rafter. The roofs at Beddington and Eltham are similar in their construction, and in all three the science of carpentry appears to be carried to the very highest excellence. The more ordinary forms of hammer-beam roofs are generally formed over buildings of much smaller span than those just mentioned ; and the absence of the large curved brace which distinguishes the latter makes them much more likely to exert a thrust upon the walls, and accordingly it is notorious that in very many cases this has occurred. In the fine hammer-beam roof at Croxton the strain was so great as absolutely to break short off the perfectly sound heart of oak pins, nearly an inch in diameter, with which it was held together ; and it is to be feared that many of the finest of these examples are similarly in a dangerous condition, and ought to be held together, before it is too late, by iron ties and bolts. The construction of this class of roof is, however, so characteristic of the fifteenth, rather than of the fourteenth century, that it is only necessary to claim their first invention as due to fourteenth-century carpenters. A special description of them must be left to another time. It will be observed that the constructors of these roofs had always endeavoured to carry the weight as much as possible to a point on the walls considerably below the wall-plate ; and we shall find, on examination of another and large class of roofs, that this was also attempted with success in another way and at an earlier period. Hammer-beam roofs grew, however, so naturally out of tie-beam roofs that it seemed necessary to mention their development to the neglect of the strict chronological arrangement of the subject.

The roofs to which reference is now to be made are those in which the principal trusses are framed with curved braces below the collar-beams, these braces either stopping on the wall-plate, or being carried down to a point on the wall much below it. The example on an old hall at Great Marlow is a good thirteenth-century instance of the first plan. Here the all-important point is that the curved brace from the collar to the rafter should be thoroughly well tenoned and pinned to the collar and principal rafter, and all tied firmly to the wall by means of a socket in the corbel which supports it. When this is the case, and the span is not so very great, this kind of roof stands very well ; but it would be a grievous error to suppose that this is likely to be the case where the material is fir in place of oak, for the system of tenons and pins was not always secure in the former, and in the latter was well-nigh useless. The roof at Kilverstone, in Norfolk, of similar construction, and only 16 ft. 6 in. span, had nevertheless become quite unsafe, owing to the giving way of the oak tenons and pins.*

Towards the end of the fourteenth century we have the magnificent roof of the Guesten Hall at Worcester, now re-erected over the nave of a new church close to the railway station at Worcester ; but the span of this roof—about thirty-five feet—was

* The roof of the kitchen at Stanton Harcourt, Oxfordshire, is a fine example of this kind of roof on an octagonal base.—G. E. S.

too great for its strength, and it was in a rapidly decaying and all but dangerous state. Sad though it is to see this, nevertheless it is impossible not to admire extremely the beauty of the work, and the extreme skill with which the decoration of the different ranges of purline-braces is contrived; and, as is usually the case in work of this date, the mouldings throughout are very good and effective. The defect of the work is, no doubt, the want of connection between the wall-pieces and the principals. The former are absolutely useless, and the whole thrust of the roof, the pitch of which is an angle of 45° , was received by the top of the wall. Had the curved braces of the principals been properly connected with the wall-pieces, it is possible that we might still have been able to look at this old roof in its old place. In the roof of St. Mary's, Reading, this defect was entirely remedied in one of the most perfect roofs ever constructed—perfect alike in design, construction, and scientific arrangement. Here the wall-pieces are very bold, and the arched ribs, being securely tenoned to them and to the diagonal braces, hold the whole firmly together, and carry the weight down properly below the upper part of the walls. This roof has the peculiarity of having no collar-beams to the principal trusses, the braces crossing each other instead; and above their intersection, and supported from it by curved braces, is a ridge-piece, above which are a series of collar-rafters connecting all the common rafters together. There are also curved braces to each pair of rafters below the collars, whilst the ashlar-pieces at their feet, instead of being perpendicular, are also curved, so as to give to each pair of rafters throughout the roof an archiform arrangement. As will be seen from the details which I exhibit, this roof is particularly well moulded, and, as its date cannot be later than about the beginning of the fourteenth century, it is of extreme value and interest. The tradition is, that it originally covered the Church of the Grey Friars at Reading, and was moved thence to the Church of St. Mary, and this is probably the fact, the church being altogether unworthy of its roof. Somewhat similar in its construction is the roof of the hall at Sutton Courtney, in the same county; and here we have a curious combination of the king-post roof with all the rafters framed together, and the kind of roof now being described. In this case the king-post springs from the collar, and there is sufficient similarity between it and the roof of St. Mary's, Reading, to make it probable that they are the work of one man; in particular, the addition of a label-moulding to the main timbers is a very unusual feature, the old carpenters being, as a rule, very firm in their resolve only to mould the necessary timbers, and not to *add* mouldings to them for the sake of effect. In both roofs, too, the purlines are set vertically on the principal, and not, as is usually the case, at right angles to it; but this is the case also at Westminster Hall, and in the magnificent roof which I now go on to describe at Penshurst. This is somewhat similar to those lately described, having an arch below, and a king-post and framed rafters above, the collar; but its peculiarity is the treatment of the purline, which rests on the collar and not on the principal, and is connected with the common rafters by horizontal and vertical ashlar-pieces. The principals, as at Easby, do not go up above the collar. This roof must have been erected *circa* A.D. 1350, and its design

is, in truth, a combination of the trussed king-post roof and the arched-principal roof.

Somewhat akin to this class of roof are the examples at Mayfield and Ightham, in which stone arches or supports play a considerable part in the support of the roof, taking the place of principal trusses. The hall at the Mote House, Ightham, has one stone arch across it on which the king-post is placed, the rest of the roof being supported on wooden arched principals. Looking at this roof in connection with the remains of the hall of the Archbishop of Canterbury's Palace at Mayfield, we may decide pretty nearly upon the way in which this latter noble apartment was roofed. It had evidently wall-pieces against the walls, above the stone arches which span the hall, from which curved braces were probably framed to support the purlines; and above the centre of the arch probably stood a king-post with framed rafters, as in the Penshurst and Sutton Courtney examples. My sketch [Illustrn. xxxiv.] will serve to show what was the probable original design of this roof, and I believe that it is a unique example, though, as has been shown, its original design may be guessed with some degree of certainty. It appears to me to be one of the most noble designs it is possible to conceive, and the class of roof to which it belongs illustrates a very interesting combination of the king-post roof and the arched-principal roof.*

The roofs at Baggiley Hall, Cheshire, and of the destroyed Refectory at Great Malvern, are interesting examples, the latter mainly remarkable for the cusping of its framework, and because the principals are alternately arched and tied with a tie-beam. This system of cusping is evidently the work of a local carpenter. It was seen in the Guesten Hall, and the destroyed hall of the Deanery at Worcester, and it is an unfortunate fate which has doomed all three of them to destruction.

Something has now been said upon all, or almost all, the varieties of early gabled roofs of which examples occur in England. But there are a large number of lean-to roofs of flat pitch, dating from the fourteenth century, which require but little explanation. The braces in the aisle roofs of Cottingham Church are worthy of attention, as valuable helps, when the width of a lean-to roof is at all considerable. It must be borne in mind generally, in looking at these old roofs, that they are mostly the work of local carpenters. Many of them are on small churches in secluded spots, and the wonder is, rather, how they should have been so universally well designed in days when the means of communication were not so easy as they are now, than how it is that they are often so rude and unpolished in their workmanship. Some of the roofs are manifestly badly constructed, and many of them follow the fashion of the day or the district. And the extent to which this was the case affords a curious refutation of the common belief in the existence in the Middle Ages of bodies of Freemasons, or workmen who moved about from one building to another, carrying their ideas and customs from one end of the country to the other. For nothing can be more clear

* The illustration [xxxiv.] shows this hall in its present state, and with the roof restored to what I believe to have been its original state.—G. E. S.

than that the constructors and designers of these old roofs were to a very great extent local men. Their work, indeed, is much more obviously characteristic of particular districts than that of any of the other workmen of the times; for, though it requires a trained eye and careful study to detect some of the local peculiarities of the masons or sculptors of the Middle Ages, they are obvious, in the case of carpenters, to the most hasty and cursory examiner.

With a few words upon the mode of framing employed, this (which is by far the most important) portion of my subject may be dismissed. This was almost always dependent entirely on the mortice and tenon, stout oak pins being used; there is no instance, so far as I know, of the use of iron straps or bolts clearly belonging to the original construction of early roofs; and many of them, especially the waggon-roofs of the West of England, have failed in consequence of the extent to which the rafters have been weakened by mortising. I may observe also that mitred joints are seldom if ever seen in old work. It is not until a late date, generally, that we find a ridge-piece, except in the case of very flat roofs. The roof of Lincoln Cathedral has two longitudinal timbers on the top of the collar-rafters, but this is a rare example of a longitudinal tie in an early roof. The roof at Wantage shows the principal rafters framed into a sort of key at the summit, and the Norfolk roofs are often similarly framed into a piece which, descending as a pendant, affords an opportunity for framing braces from the principal to the ridge, without a king-post, and so supplying the necessary rigidity and stiffness to the length of the roof. The arched braces which were largely used for the support of purlines and other horizontal timbers, are a very important feature. They are ordinarily thin pieces of timber, laid on a rebate in the back of the principal rafter and purline. When used in this way they stiffen the whole construction, and help to support the underside of the common rafters, but they in no way support the purlines: and, accordingly, in some roofs, where the existence of a queen-post allowed of it, we find braces from the queen-post to the purline, as at Harmondsworth, North Walsham, and Westminster Hall. In these cases the purline is usually placed perpendicular, instead of sloping at right angles to the principal rafters. Sometimes, as in the Prior's Hall, at Wenlock, we find two purlines placed near together, and the space between them filled in with tracery, binding the whole together into one very firm trussed purline. The Norfolk roofs have usually arched braces from the wall-piece to the plate, and though these were mainly useful for ornament, they were intended to secure the entire immovability of the wall-piece, on which so much depended. The common rafters, which are always in one length and notched for the purlines, are usually mortised and tenoned together at the ridge. Their dimensions vary, but, speaking generally, they are about 6 in. by 4 in., but in some cases are as much as 8 in. by 6 in., as at St. Margaret's, Leicester, or 7 in. by 7 in., as at Lincoln. They are ordinarily laid flat-wise, and their feet generally project well beyond the face of the wall. In early roofs the common rafters are never chamfered, but in late roofs they are frequently either chamfered and stopped or moulded. Comparatively few roofs were boarded, unless it was intended to

cover them with lead, in which case the boards were generally laid with a space of about one or two inches between them. At Crawley, in Sussex, the space between each rafter is filled in with boards let into a groove in the side of each rafter. In the porch roof at St. Martin's, Guernsey, there is a similar arrangement of boarding between the principal rafters of a curved roof; but in this case the boards are arranged horizontally, instead of vertically, as at Crawley.* Boarding was, however, constantly used on the underside of the rafters, in which case it was usually subsequently divided by vertical and horizontal ribs into a succession of panels; this kind of treatment is often found in a portion only of a roof, as *e.g.*, over the rood-loft, or over the altar, the remainder of the roof consisting simply of framed rafters. The mouldings of these roofs are, as will be seen from the details that have been given, generally cut with much skill. The workmanship is spirited, and though a little rough to the eyes of those who like to see sandpaper in the hands of a carpenter, nevertheless a model for modern workmen. It is seldom that mouldings are added to timbers in such a way as to make them look unconstructional, as in the case of St. Mary's, Reading, and the hall of a house at Sutton Courtney, where the arched brace of the principal has a sort of label added to it, which, had it been cut out of the solid, would have involved the cutting to waste of a very large piece of timber; and this the old carpenters never did, if they could possibly avoid it. They used some of the best timber in the world, but they used it carefully and economically, as knowing its value. One fault is common to most of the more ordinary description of roofs—the use, namely, of large quantities of sap-wood. It is rare, indeed, to find an old roof which is not suffering from this cause.

The pitch of old roofs was very various, and depended rather on individual choice than anything else; for though, speaking generally, it is true that early roofs were steep in pitch, whilst late roofs were flat, there are yet examples of very early and very flat roofs; and, on the other hand, the Norfolk and Cornish roofs down to the end of the fifteenth century are commonly of good pitch. It is hardly necessary to say that the steeper the roof the less is the necessity for any direct tie at its base. There are examples of roofs with a collar quite near the ridge, or with no collar at all, which depend entirely upon the steepness of their pitch, and the hold which their curved braces have upon the wall some distance below the plate, and which still stand after four hundred years' exposure. But if one is to apply the lessons which most of these works teach us, there are, I think, some which we shall be wise in taking caution by. In the first place, I repeat that wherever it is possible we should do well to introduce a tie-beam. If, however, we have walls so low that our tie-beams would cut across openings, then we must have recourse to some of the other varieties of indirect tie which the old carpenters invented. There seems usually to be no reason why we should not avail ourselves of iron bolts and straps for the greater security of our framing. The old carpenters seldom, if ever, used iron. Possibly this was because all their work was in oak, with which it was

* The roof at Lingfield is similarly constructed. The roof in Holy Trinity Church, Coventry, affords an example of carved boarding between moulded rafters. At Hadley, Middlesex, the boarding of the transept roof is let down into a rebate in the rafters without any use of nails.—G. E. S.

not convenient to use it. They trusted entirely to tenoning and pinning with stout oak pins; but it would be madness to trust entirely to these where we use fir, and hence to emulate their designs we must use iron. One of the commonest defects of early roofs is their tendency to fall out of the perpendicular the lengthway of the building. This tendency was counteracted, when it was discovered, by the adoption of purline braces, and braces from the king-posts; and we should do well to bear it in mind.

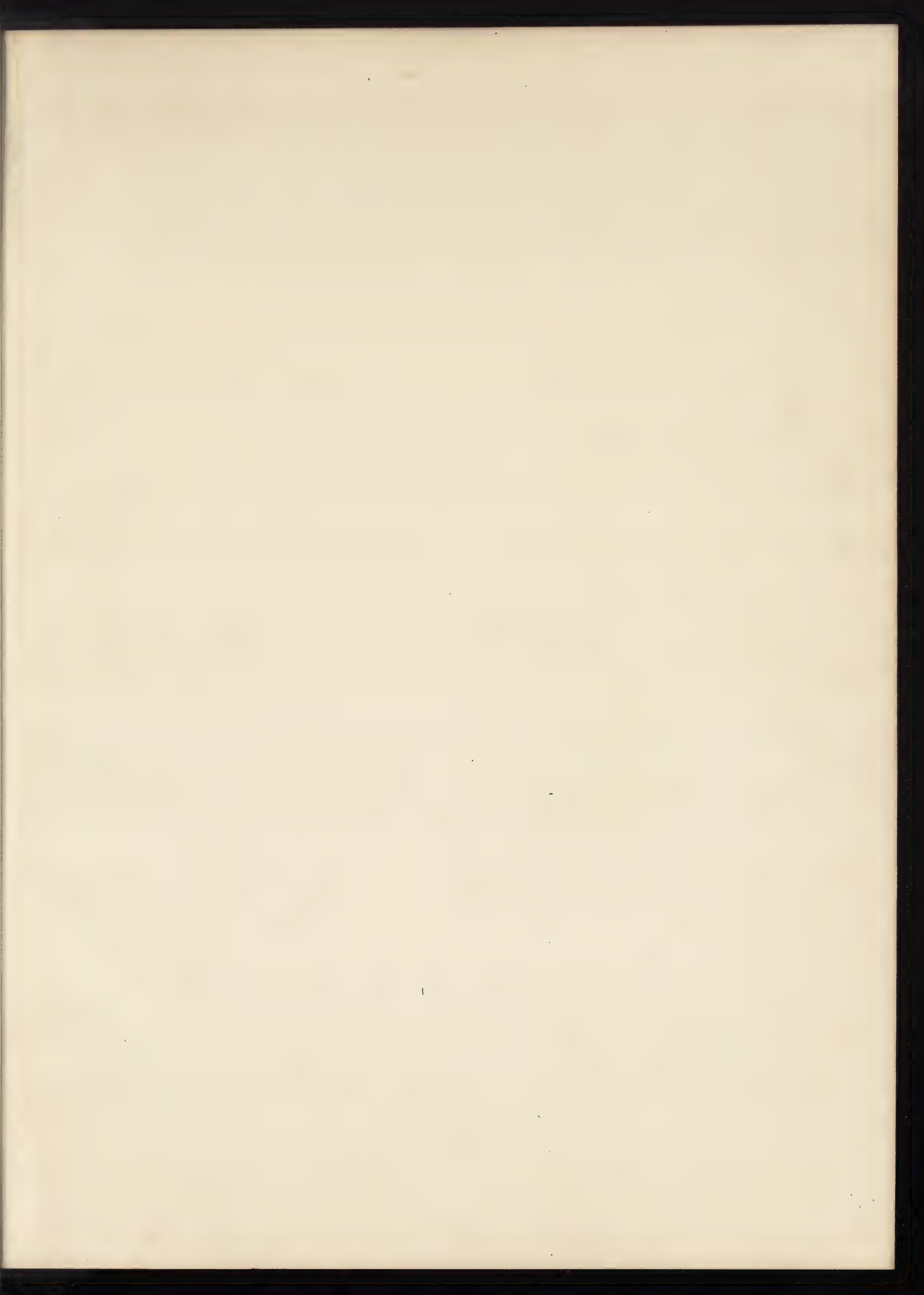
I now proceed to the next branch of my subject—the construction of wooden spires and turrets. There are numerous examples of these, and, generally speaking, the system of framework is much the same. In order to secure a firm base, the framework is ordinarily commenced some few feet below the upper part of the wall on which the spire is set; and then on the top of the wall four large beams are laid crossing, and framed to each other, so as to form four points of support within the tower; upon these four intersections* are placed four uprights, and these again are held in their places by diagonal braces crossing each other, and securely halved and pinned with oak-pins wherever possible. Purlines framed to the octagonal plan of the spire are occasionally introduced, supported by struts from this framework, and on these the common rafters rest. Upon the top of the four lower upright timbers, when the spires are of large dimensions, another system of crossed tie-beams is introduced, upon which the same construction is repeated as below. The spire of Chesterfield Church, constructed in this way, has, as is well known, failed, and twisted to such an extent as to be one of the architectural puzzles of the day. There can be little doubt that this was caused, to some extent perhaps, by some defect in the lead covering, and the consequent admission of wet, and decay of some of the timbers, but mainly by the effect of the sun on the south and south-west sides of the steeple, which, if the timber was green, would be very considerable; and, in illustration of this, it may be mentioned here, that most of the old spires constructed of timber and covered with lead are twisted in the same way. The spire of the church at New Walsingham is an example of this; and, on the Continent, the spire of the church at Mayen (near the Moselle), and that of one of the churches at Dijon, are examples of at least as great a curvature of the lines of the spire, though in neither case has the whole work fallen so much out of the perpendicular as the Chesterfield spire has; and examples of the same thing might easily be multiplied. In England the usual custom was to cover these steeples with cleft oak shingles—a light and very durable covering—and in no case does a spire covered with this material appear to have failed. These spires are very frequent among the old churches of Kent and Sussex, and are exceeded by few in simple beauty and appropriateness of character.

The churches in the Eastern counties have often a very delicate and small spire covered with lead, rising from the centre of the roof of the tower, but the dimensions of these are so small as not to be of much importance. Hunsdon Church, near Ware,

* When the spire is very small, it is constructed with a king-post supported on two cross beams, as in the example in Trotton Church, Sussex.—G. E. S.

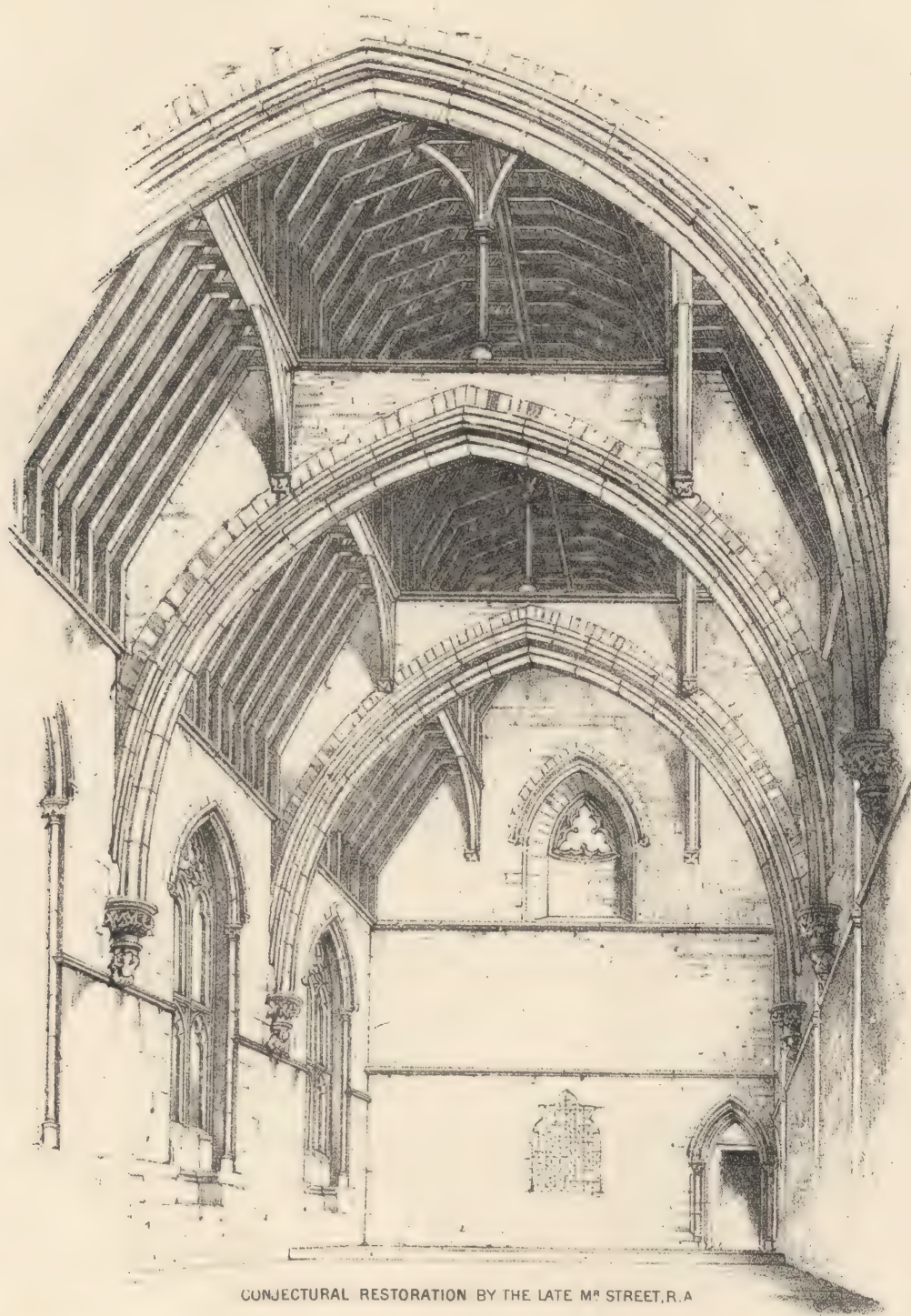
is an example of this class. At East Harling, in Norfolk, there is a wooden spire, with spire lights and pinnacles, covered with lead, which recalls the magnificent Continental examples of this kind of construction. In this case the timber is nowhere exposed to view, but covered with lead beaten down round its mouldings and carvings. But in England we have no very grand example of this kind of carpenters' work, and we must go to Amiens if we wish to see how the enormous weight of a spire or *flèche*, between one and two hundred feet in height, may be successfully carried from points of support far outside its natural base. The wooden turrets supported from the floor, and so common a feature in the old English country churches, ought not to be forgotten. They almost always have four angle-posts framed into heavy sills, lying on the floor and framed and braced together above; and finish externally with a low spire. The stone spire of Salisbury Cathedral is filled with a complicated framework of wood, constructed in a very similar way to those just described; it is easily accessible, and (which is important) it is not too dark to see the construction, as it usually is inside a shingled spire. Here we see a central post, and four posts outside it forming a square; these are framed together with horizontal ties, strengthened by arched braces; and though all the woodwork is rather rough, considerable attention is shown to the design, and the timbers are chamfered and stopped. It is not a bad illustration of the absolute inability of the old carpenters to do their work without some attention to design.

The use of timber for the construction of the whole framework of buildings was in many districts very frequent indeed. One of the oldest churches in the kingdom—that at Greenstead, in Essex—is constructed of half-round pieces of timber, and there are instances at a later date of wooden churches (of which Lower Peover, Cheshire, and St. Leonard, Ribblesford, the desecrated but most interesting church at Newtown, Montgomeryshire, and the old church at Newland, Worcestershire, are examples), some of which have wooden arcades between the nave and aisles. It is in domestic buildings, however, that wood was most used in the Middle Ages; and the variety of examples is so great, and their character so well known, that it is unnecessary for me now to do more than just mention them. The foundation on which they are built is ordinarily of stone or brick, and this is carried up to various heights; sometimes only up to the ground line, or to a plinth just above the level, and at others up to the underside of the first floor. In the street at St. Peter's Port, Guernsey, stone party-walls are introduced between the wooden houses, and these, coming out to the face of the building, and boldly corbelled forward so as to correspond in projection with the woodwork, were no doubt found to be necessary in towns, in order to stay the progress of fire. The system of construction was generally uniform. Upon the brick or stone base was laid a large plate, into which the corner-posts and intermediate principal-posts were tenoned and pinned. Horizontal pieces were framed above and below window and other openings, and curved braces, framed across the front of the smaller intermediate timbers, connected and stiffened the whole. The angle-posts were a very important feature, and where (as was so often the case) the upper storey overhung, they are necessarily of very large size, and often covered with sculpture. The joists forming the floors of the





INTERIOR SHOWING ITS CONDITION IN 1865.



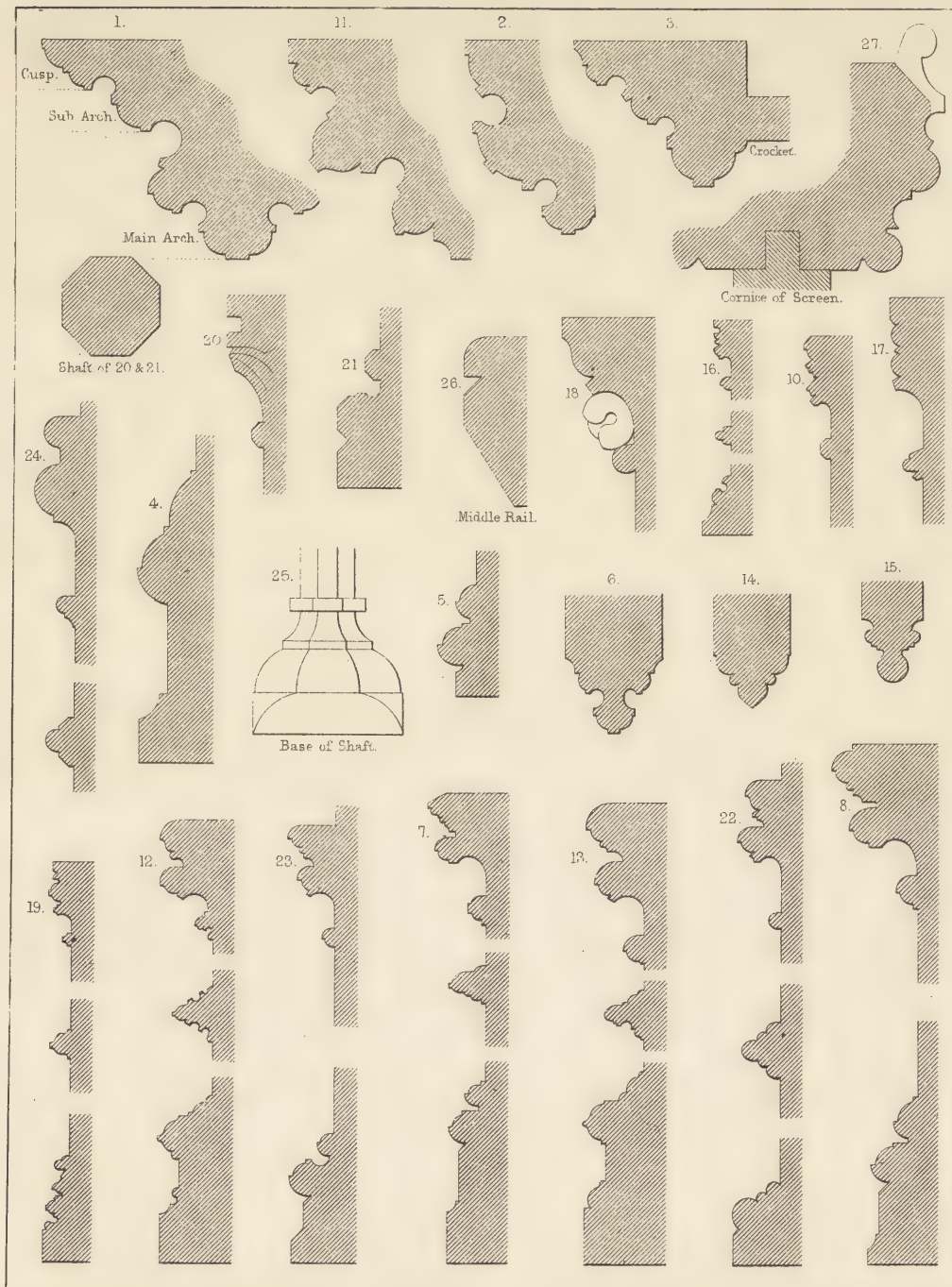
CONJECTURAL RESTORATION BY THE LATE MR STREET, R.A

T MAYFIELD, SUSSEX.

C.F. KELL, PHOTO-LITHO. 8, FURNIVAL ST HOLBORN, E.C.

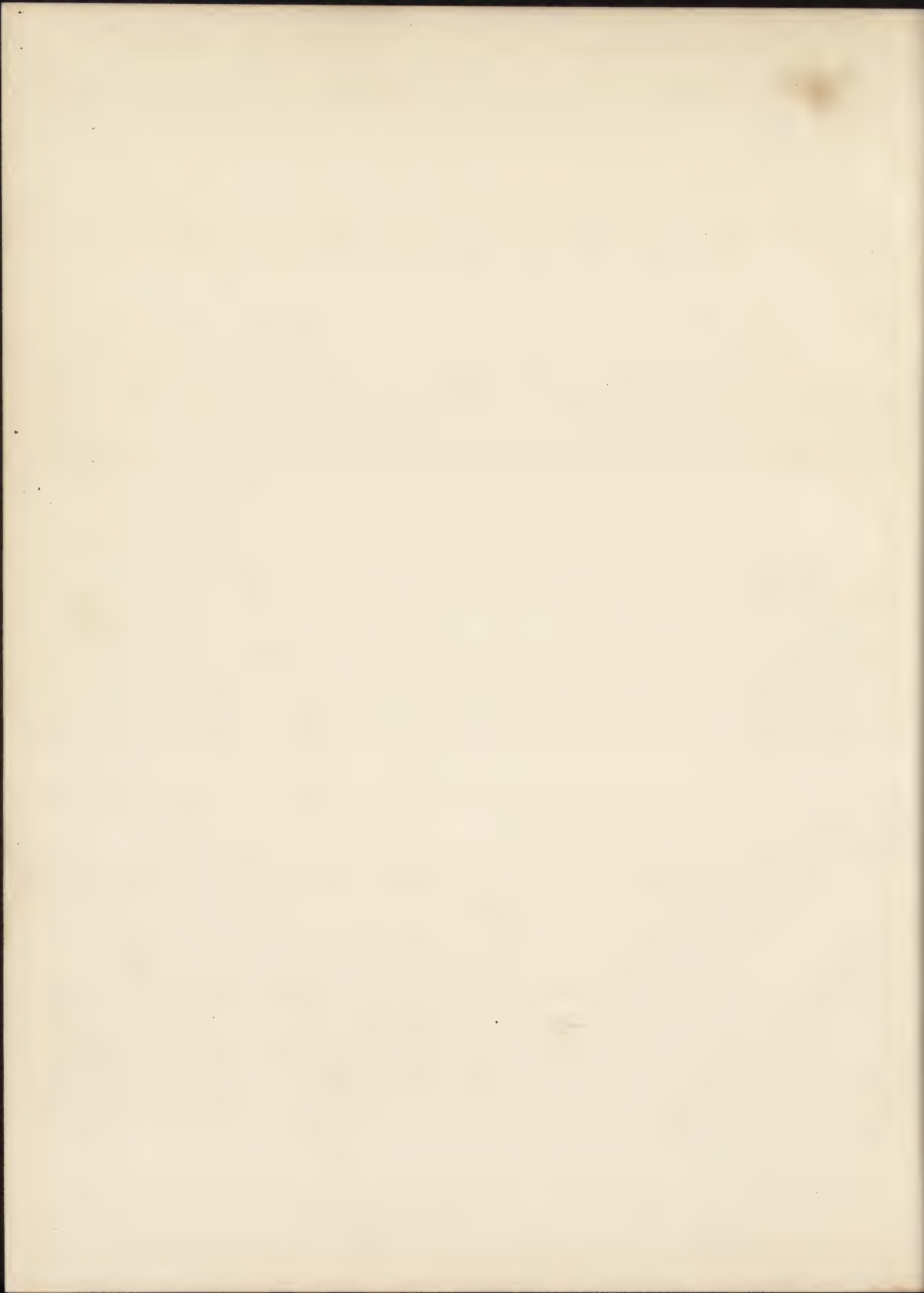


TRANSACTIONS OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, VOL.V, NEW SERIES.
 LXIV. THE LATE MR STREETS'S CONTRIBUTIONS TO THE INSTITUTE (xxxiv.)



1 to 10. FROM STALLS, WINCHESTER CATHEDRAL. 17. BURY, HUNTS: BASE OF LECTERN. 22. SALISBURY CATHEDRAL.
 11. 14. ST MARY'S HOSPITAL, CHICHESTER. 18 & 19. BEVERLEY: SEDILIA. 23. CHICHESTER: SCREEN ON BISHOPS PALACE.
 15 & 16. SELBY CHURCH: STALLS. 20 & 21. COMPTON CHURCH: SCREEN. 27. OLD SHOREHAM CHURCH: SCREEN.

ENGLISH WOODWORK IN THE XIII. AND XIV. CENTURIES: MOULDINGS.



next stage ordinarily projected forward considerably, and were rounded, moulded, or carved at the end, and supported by curved braces from below, and upon these again another plate was laid, above which the same construction of posts and braces was repeated. The gables were finished with a considerable projection, protected by verge-boards, upon the decoration of which all the skill of the workman was exerted. The spaces between the wooden framework were either filled in with plaster or with brickwork. Timber houses are, as has been already observed, almost always boldly corbelled forward in each stage, and owe much of their extremely picturesque effect to this arrangement, whilst at the same time their strength was not at all diminished by it. It is a remarkable evidence of the enormous number of wooden houses erected during the Middle Ages, that, in the volumes of Mr. Parker's *Account of Domestic Architecture in England (Fifteenth Century)*, a large proportion of the examples illustrated are executed in wood; and though the remains of the fifteenth century are of course much more plentiful than earlier works, there are nevertheless many remains of the latter. The curious thirteenth-century window at Coventry, now built into a modern house, is a valuable, if not unique, example; and there are at Lewes some equally good examples of fourteenth-century windows; whilst the fine fourteenth-century head of a doorway at Goudhurst, and the still earlier wooden door-frame, with a square trefoil head in the south wall of the chancel, of Ascott Church, Oxfordshire, are examples whose interest is much increased by their extreme rarity. The framing of the gable end of Guesten Hall, Worcester, may also be named as an early example. Mention has already been made of the roofs of some of these wooden domestic buildings, and it is evidence of the uniform way in which the ideas of the mediæval carpenters were carried into execution, that barns—as at East Barsham, Harmondsworth—and stables and offices, such as we see at Hever Castle, were all constructed on the same principles, and with the same consequent solidity and general goodness of effect.

The floors and ceilings of the Middle Ages require a short notice. The former were not by any means commonly executed in wood; on the ground floors of old houses and in churches the only wooden floor ordinarily is that under the choir stalls, though, as far as can be judged from the representations in illuminated manuscripts, the foot-paces or floors under the altars were also often of wood. The wooden floors under stalls were often raised on a stone plinth in which ornamental openings were perforated for the sake of ventilation. The floors of upper rooms were usually constructed with heavy and square timbers resting on wood plates, which formed the cornice to the rooms. Under these again were occasionally stone cornices, and the moulding of the rafters and girders below them were the principal decorative features. In other cases the undersides of the floor joists were covered with boarding, and this again divided by small ribs into panels, with bosses at the intersection. The ceilings of the nave and of the eastern part of St. Albans Abbey Church are remarkable examples of fine flat ceilings of very early date, and the underside of the floor in the tower of St. Cross, and of the similar and well-known floor in the chapel of Merton College, are

illustrations of this kind of work at a rather later date. A few words must be said upon the wooden groined ceilings which are of not unfrequent occurrence in old buildings. The choir and lady-chapel of St. Albans, the church at Warmington, and the cloisters at Lincoln, the towers of Exeter, and the lantern of Peterborough, are fine examples of this kind of ceiling, and all of them of early date. The thirteenth-century church at Uffington, Berks, was also evidently groined in this way above the eastern part of the chancel, for, whilst the walls and buttresses were wholly insufficient to resist the thrust of a vault filled in with stone or chalk, the stone springers for the vaulting nevertheless remained. All these wooden vaults were constructed in the same way. They spring from stonework carried up as high as was required to free the ribs from the wall, and there was no special mark of division at the point where the stonework ceased and the woodwork commenced. The boarding was let into a groove in the sides of the ribs, or laid on a rebate. There seems to be no good reason why this kind of ceiling should be condemned, as it has been by some writers, as though it were unreal or in any way a sham. It is, in truth, nothing of the kind, and no attempt was made to make the work look like stonework. The boarding was frequently feather-edged, and grooved and tongued, and thus obviously of wood. The advantages which it possesses over stone are considerable—for, first, it may be introduced in buildings not calculated to resist the thrust of a stone vault; and, secondly, it may be carried far up into the roof, and above the top of the walls, which in stone vaults is always, within a little, the limit of internal height attainable.

There are many examples, either of wooden cloisters, or (as in some of our old almshouses) of passages corresponding with cloisters. The Dean's cloisters at St. George's, Windsor, are a good example, with sills, upright posts, and arched and trefoiled braces connecting them with the plates. Their date is doubtful, but they are probably not later than the end of the fourteenth century. The doorways of wooden houses were a favourite subject of decoration, and are frequently protected by flat canopies supported on boldly projecting braces. The old houses in York afford several examples of this feature. The canopy in front of the door at Goudhurst, Kent, is a good fourteenth-century work. The wooden porches of the Middle Ages are very numerous, and of all dates. One of the earliest remaining is that on the north side of Horsemonden Church, Kent—an excellent example both in general design and in all its details. The porch at Facombe is of similar date, and others have been drawn, I think, by Mr. Brandon. Their construction is generally very similar. Upon a stone foundation is placed a sill, into which are tenoned upright angle- and door-posts, and generally one upright in the centre of the side. Cross-pieces are framed to these a short distance above the sills, and a plate at the top, and the open spaces between the cross-pieces and plate are filled in with open tracery, often of the most elaborate kind. The gables are finished with verge-boards, and the roofs treated in the ordinary way. These porches are generally placed on the north side of the church, in order to protect them from the influence of the sun.

Oak lych-gates are peculiar to certain districts. That at Beckenham—a well-known example—is one of the most picturesque, and it owes its character to the arrangement of its supports with their necessary braces, and not at all to any beauty of detail, of which there is none whatever—its builder rightly feeling that its exposed situation on the public road made the severest simplicity of all its parts most desirable. The remains of ancient doors are very numerous. The earlier examples consist usually of ledges only, on which the boards were nailed. Sometimes, as in a fine example in the Refectory at Beaulieu, these ledges were framed diagonally, but with a curious disregard for symmetry or uniformity in the size of the panels. The door at Lincoln is an example of the same date. That at St. Cross, of the same date, has the framing arranged rectangularly, and this is the more common arrangement in all subsequent doors; the Lingfield and Westminster doors are instances of this in the fifteenth century. Often, as at Brookesby and Luton, the door is adorned externally with tracery. This is especially the case with doors in the fifteenth century, when the smiths' work was so inferior to the work of the men who made the glorious thirteenth-century hinges, that there was no longer any special reason for leaving room for its exhibition. The internal framework of the door at Luton is an exquisite example of the fourteenth century, and the carving on the door at Cobham is also very effective. In the rood-screen at Exeter are doors formed in the same way, but with diagonal open framing, and without any boarding, so as to be open through all the quatrefoils.

Wooden windows have been already mentioned, but it may be added here that wooden windows were sometimes introduced into stone, brick, or flint walls. The church at Englefield, Berks, affords an example of this in the fifteenth century. Stone windows had often, also, oak lintels inside, in place of stone arches, and this was especially the case in clerestories, where the space was so small as to render the insertion of a stone inside arch a matter of difficulty.

Staircases were very seldom constructed in wood. That in the hall of St. Cross Hospital is a fair example of their old treatment; but they are often much more rude, and constructed of heavy logs of timber. There are also some examples of newel staircases framed in wood, but none in England which will bear comparison with the very fine example in the north-west tower of Rouen Cathedral.

Many ancient bell-wheels and carriages remain, and those at Wymering Church are examples of the best kind. The carriages are simply framed, with arched braces to support the central part under the sockets, on which the wheel hangs, and the chamfering of the spokes of the whole is admirably executed. Luffer-boards seldom remain in their old state, and seem always to have been of inferior type to the enormous Continental examples. Sometimes, as at Addington, Bucks, they are merely boards cut out to the size of the window, and perforated with small cusped openings. Gates and fencing were constructed very much in the same way as at the present day, and good examples of the former are to be found in illuminated manuscripts. Of scaffolding there are very few particulars to be gathered. No doubt the access to it was

generally by inclined planes of wood,* such as are ordinarily used on the Continent at the present day. In one of the sculptures in the Chapter-house at Salisbury, a workman is represented ascending by such a contrivance. But ladders were in use, and of the kind we now have—witness the painting in the Lady-Chapel, at Winchester, of an artist painting the figure of the Blessed Virgin, whilst the Devil takes his ladder away. And there were, as well, ladders of that much more solid description often met with in old belfries—as at Monkland, Hereford—consisting of enormous pieces of timber inclined to a considerable slope, and on which heavy triangular logs are fastened for treads. Materials were hoisted from the ground by ropes coiled round great wooden wheels, inside which one or two men walked as in a sort of treadmill. One of these wheels, admirably designed, still remains in the steeple at Salisbury Cathedral.

The second head of the subject may be treated of at much less length than that at which it has been necessary to speak hitherto. Articles of church furniture, such as screens, seats, stalls, pulpits, and the like, have been made the subject of study more, perhaps, than the more important constructions which have been described in the previous portion of this Paper. They present, too, less of general character, and a treatise on them must, to some extent, consist of a special description of each example of every class; and this is more easily done by means of illustrations of several of the more remarkable remains, than by descriptions of them. Of old screens an enormous number of examples still exist, and many are of early date. The earliest is probably the semi-Romanesque screen at Compton, Surrey, and the next in date the early thirteenth-century example at Old Shoreham. The mouldings of the slightly-later screen at Northfleet are given on one of my drawings. Very much about the same date is the simple screenwork at Sparsholt, and the fine screenwork at St. Mary's Hospital, Chichester. Turning from these early Middle-Pointed examples to the complete Middle-Pointed style, we have numerous examples. The screens at Thame and Ilmer, evidently the work of the same hand, are early examples. The fine woodwork from Ottery St. Mary, of more massive character than is usual, is of the same date; and close in succession to it come the screens at St. John's, Winchester, at Roydon, Ewerby, the chapel in the Palace of Chichester, Cliffe-at-Hoo, and Lavenham, and the fine screen and stalls in St. Margaret's, Lynn. The lower panels of early screens were generally filled in with feather-edged, grooved, and tongued boards. The monials were delicate columns, and the tracery was very simple, and cut out of long pieces of board, from two and a half to four inches thick. The capitals were pinned to the tracery with vertical oak-pins, as in the example from St. John's Church, Winchester. At a later date the lower part of the screen was panelled, the monials were

* In the keep of the Château-de-Coucy, a series of putlog holes exist all round the wall. There can be no doubt that these holes were left after the inclined plane by which all the materials had been taken up had been removed. Inclined planes are represented in the mosaics at St. Mark's, Venice. At Ratisbon a tower was constructed with inclined planes, by which even laden animals could ascend with materials for the highest part of the building. This still remains.—G. E. S.

moulded, and the whole work was much more complex. When there was a rood-loft, the framework was carried up to a stout beam, and another beam let into the wall on each side was provided for the support of the loft, and the space between this and the screen filled in with groining or coving. The screen at Ilmer is a rare example of a wooden screen resting on a stone base.

What was said as to the general ignorance of early examples applies especially to seats and stalls; but this is in part owing to the fact that in our early churches wooden seats were not often introduced. The usual contrivance was a stone seat, sometimes against the outer walls, and occasionally round the base of the columns, on which probably the women and old people sat, whilst the rest of the people stood and knelt on the floor. There are obvious differences between the few remains of early seats and the later examples. The former have generally their ends cut out of the solid; I know none which are framed. The ends are seldom square in outline, but usually cut in curved or cusped outlines, and they have simple and little carving. Of early stalls the examples are more numerous. Those at Winchester are the finest examples remaining, full to overflowing of beautiful detail and lovely carving, and exquisite in every portion of their design. Those at Hereford are very fine, and other magnificent examples remain. Remnants of these early fittings will sometimes be found built up among modern pews. At Selby the stalls (concealed in this way) are the most delicate and refined in their design that I know, whilst at Clifton Campville and Wyton there are small remains; at Exeter there are numerous splendid misereres re-used in the modern stalls, and at Salisbury a most admirable assemblage of stalls. In these examples you will observe a delicacy of curve and a refinement of design far in advance of that which marks the later works of the same kind, and they deserve, therefore, the most careful study. Look, for instance, at the Salisbury stalls: they are delicate and refined in every point, the carving of foliage is admirable, and the ranges of dog-tooth and other enrichments in their mouldings are most effective.

The old chancel arrangements were usually somewhat different from those to which we are now used. In parish and the smaller collegiate churches there was seldom more than one row of stalls. There were no subsellæ, and only a desk in front of the stalls. Probably, as we see in illuminations, and at the present day in many foreign churches, there was a large central lectern for the choir to sing at, out of one noble illuminated book. The earliest English example of the desk before the stalls that I know is at Rochester, built up in the modern stall-work, and which is a low desk for kneeling at, and probably dates from the end of the twelfth century. At Salisbury none of these desks remain; and at Exeter, where the collection of carved misereres is the best in England, they alone remain, preserved evidently from the earlier church when the present choir was built. In Wells Cathedral there was, a few years ago, some very fine oak stall-work of the fourteenth century. These fittings have all disappeared. I suppose there were no carpenters in those parts, so the architect got rid of the old rubbish and fitted up the choir with a

long range of stone stalls—parson coolers—and so soon does the memory of old things pass away, that when I was last at Wells the vergers vowed very positively that they never had any such work as that which I sketched there in 1847! The small parish church at Etchingham used to (and may still) contain one of the best examples of screen, stalls, and desks, of good fourteenth-century work, that I know; and there are a great many more or less perfect examples in churches all over the country.

Suffice it to add, that in England we have examples of every kind of furniture and fitting for our buildings, all designed as well, and in the same style, as the work I have been describing. The wooden retable at Upton, the lecterns at Leighton and elsewhere, the church chests, the cope chests, the wooden sedilia, the tables, the vestment presses of our mediæval churches, are all alike admirable, but I can only refer to them in this very general way. So, too, I can say nothing about domestic furniture and utensils, or about the vast collection of examples of woodwork of various kinds, which may be found in the pages of illuminated manuscripts.

The little sculpture of wood sparingly introduced by the early artists was always thoroughly good of its kind. The finish of the wall-plates in the Horsemonden porch, and the carving of the miserere seat, so curiously preserved in the midst of woodwork some three hundred years later in date, in Henry VII.'s Chapel, are fair illustrations of the goodness of the earlier sculpture; and it will be seen, if this kind of work is attentively examined, that it was wrought altogether on the same principles as the corresponding sculpture in stone. We see the thoroughly conventional early school, the naturalesque Middle-Pointed school, and the again conventional Third-Pointed school of carvers, succeeding each other in exactly the same way as among the contemporary workers in stone; the main difference between the two being, that the work in wood is ordinarily very much more thin, flat, delicate, and sharp than the work in stone.

Moreover, the carving in wood had always some limits set to its exuberance by the nature of the framework in which it was wrought. It has been observed before that in carpenters' work it was always the rule only to mould the useful members, and so it was also as regards the carving. It was not either useful or convenient to put on to a piece of oak framework a mass of oak to be carved as a boss or a stopping to a label, and so it will be found that most of the old wood-carving is so contrived as to be wrought out of the same plank or thickness as that which is moulded, or else is a separate piece of wood—in a spandrel, for instance, enclosed within the constructional members. The spandrels in the arcades behind the stalls at Winchester Cathedral are an admirable example; they are carved in thin oak, perforated in all directions, and then set forward about half an inch in advance of the back panelling. The effect of this is, as may be supposed, to give the carving the most distinct relief; and it is an effect strictly lawful, because it was impossible in other material, and yet natural in woodwork. The same attention to the material will be found exemplified very remarkably in all old wood mouldings, and my illustrations will serve to show how extraordinarily minute, delicate, and sharp

they were. In the stalls at Selby we see an elaborate cap, only $1\frac{3}{4}$ inch in height; at Winchester a band $\frac{7}{8}$ inch in height, and yet consisting of four distinct members, and showing in elevation as many as eight distinct lines.

Early wood mouldings [Illustn. xxxv.] are generally such as could not be executed in any other material; they are sharp, delicate, minute, and quaintly undercut. Every curve is subtle; every alternation of round and flat and hollow thoughtfully contrived, graceful, and yet vigorous. They are very often unlike any stone mouldings, just as many wood traceries (as, *e.g.*, those of the screen at St. Mary's Hospital, Chichester, and the stalls at Lancaster) are quite unlike what could conveniently be executed in stone. They deserve, therefore, the highest praise, and in spite of a bad fashion which obtains just now of ignoring the value of mouldings, I maintain two propositions in regard to those which I describe. First, they are very English in their character, and therefore ought to be admired by Englishmen; and secondly, I venture to assert that if a thoroughly accomplished artist, who had never seen or heard of English work, were to study attentively a sheet of English mouldings, he would not fail to say that they proved conclusively the existence of a school of art in this country of almost unsurpassable excellence; and if this is true it cannot be bad advice, to those who want advice, to tell them to study these English mouldings for themselves.

I have shown, I hope, that in spite of its perishable nature we still have examples of every kind of work in wood, wrought by our own forefathers, and the endurance of so much of which to the present day is the best evidence that it is fitted for our climate and our wants. Well, is it wrong to construct timber roofs, and to let them be seen? If not, how is it that for ages our architects have been ashamed of them? They had no authorities forsooth among their classic loves, and so they found it convenient to disregard those of their own country. Again, is it wrong to regard the material in which you work, and to make some artistic use of one of the two great building materials which God has given us? If not, why have our architects for ages done their best to lead men to suppose that the joinery, the furniture, and the fittings of our houses and churches ought to be bald and ugly, and badly framed and glued together? The truth is that, dispute as much as we may as to who were the best masons, or who were the best sculptors in stone, the question as to the age which produced the carpenters is one which admits of no dispute whatever for an instant. This being so, let me entreat those among you who are beginning the study of your art, to remember how enormous the advantages are which this country offers you. It is, indeed, one vast museum, full of precious cabinets, fitted on all sides with gems and jewels. You have but to look around you, and on all sides you have material for study. Do all of you know the woodwork of our great Abbey of St. Peter, its roofs and its furniture? If so, do you know the carpentry at St. Albans? or the singularly rich store which still remains at Salisbury? If you do not, take my advice, walk from hence to Salisbury, examine every church on the way, and finally devote yourselves to drawing every bit of old woodwork you can find there. Draw the magnificent roofs

over the vaulting, observe the quaint ingenuity of those over the aisles, draw the stalls, the cope-chest, the vestry-chest, the table in the Chapter-house, the lovely monument of William Longespée, the framework in the spire, the wheel for raising stone for the tower ; study all these carefully, marking all the niceties of treatment, the mode of framing, the system of moulding, and the character of the carving ; and I venture to say that when you have done this you will know more about the real carpenter's art than you will ever learn from the ordinary routine of an office, or the reading of all the text-books you can collect upon your shelves. Act on my advice and you will thank me for giving it, for, long before one is old, one finds oneself too busy to sketch and study old examples as systematically as one could wish ; and as I learnt my art by walking about England with a knapsack on my back, so I venture to urge you to do the same.—GEORGE EDMUND STREET.

[4.]

SOME OF THE DIFFERENCES OF STYLE IN OLD BUILDINGS.*

[The late Sir William Tite, *President*, occupied the Chair.]

MR. PRESIDENT AND GENTLEMEN,—

MY purpose is to lay before you some considerations as to the causes which produced the differences of style observable in mediæval buildings throughout Europe. The subject is one full of interest, and has the special advantage to me that it has, so far as I know, seldom, if ever, been properly discussed. Men have written and talked and lectured too much as though Gothic architecture could have its history concisely written in a few chapters on one country, and as though by the time a man had mastered his "Rickman" or his "Viollet-le-Duc" he had covered the whole ground that was open to him. This ignorant mistake (I can call it nothing else) is likely to be, as it has hitherto been, calamitous in its consequences. Looking at modern works, I think one may see its effect in the thoughtless acquiescence in the laws of custom which they too often show. Take for instance our church architecture, and what do we see ? Our new church consists almost always of a building planned within very close limits as to variety ; we have the eternal nave, aisles, and chancel, with as few evidences as possible of the personal feeling of the artist ; whereas, if we look carefully and largely at old buildings, we shall find that they show much greater variety than ours, and that their architects were much less hampered and restrained by self-imposed rules than we allow ourselves to be. I am speaking especially to those who are my juniors—for to my seniors all that I can say is already well known—and I desire to point out to

* The original Paper, which has been slightly condensed, was read on 29th November 1869. It will be found in the First Series of TRANSACTIONS, 1869-70, pp. 25-41.

them the extreme interest and pleasure which they may derive from the study of their art if they will but go into it patiently, thoroughly, and lovingly, and with a view to analysing all the causes of its variety. Such study is the only true road to real honour or real reputation, or to that credit with their countrymen hereafter which constitutes a glorious difference between our art and many other pursuits. It is the special glory of our national architecture that its developments are so many, so various, and so true in principle, that no one who has zeal and brains can avoid becoming enthusiastic in the study of them. Nor is it a slight matter for joy that in an architect's studies, and in all his work, he will find that he is dealing with men placed exactly as he is now; and that the more he knows of their means and the difficulties they overcame, the more he will see that they were precisely those which he has to meet, day by day, in his own work.

Now, the differences in style in old buildings are very great, and the result of various causes. It is to be observed, first of all, that though mediæval art is in one sense entirely harmonious in all parts of Europe, it is equally true that it is subdivided endlessly by little distinctions of district, province, or country, which serve practically to create endless varieties of style and detail, all in progress at the same time. It has been very much the custom to assume that these local varieties indicate divergences of principle, so that it is not safe for one man to study more than one of them. This is simple nonsense—for it may much more truly be said that no one does understand Gothic art who has not studied that of more than one country; and it is most undoubtedly true that there is as much difference in the style of old buildings in the various counties, districts, or provinces of one country, as there is between any one of these and some one variety of another country.

The work of old architects owed not a little of its vigour to its variety. Each man who had any inspiration did the best he wot of, and of course produced his school of followers. But the fact that so many men did this shows how infinite are the variations of which Gothic architecture is susceptible, always in strict obedience to the true principles upon which it was founded.

The causes of variety were numerous, and each one of them deserves a separate chapter in a treatise. Among them are such as these:—

- (a) The requirements of material—which are obviously different in districts which allow of the use of only (1) stone, or (2) brick, or (3) timber.
- (b) The influence exercised in certain districts by exceptionally gifted architects.
- (c) The spread of art-knowledge by orders of men, such as (i.) Freemasons; (ii.) Religious Orders, whose habits gave them knowledge of countries other than those in which they were for the time working; (iii.) in the course of conquest or colonisation of one country by another; and (iv.) the employment (not at all uncommon in the Middle Ages) of foreign architects.
- (d) Attempts in one age to copy work done in a previous age.

The requirements of the most available material certainly played no small part in the history of architectural development. We must remember that of old an architect

was almost compelled to use the material nearest to his hand. Water conveyance was the only chance he had of importing the material of one district into another, and of this ample use was made. But of course the opportunities were rare. You all know that Caen stone was, to some extent, used here at a very early date. Portland stone was transported to Cornwall, as I remember telling you in this place when describing the church of St. Michael-Penkevel. Stone from the south of England was taken by water to the Humber and used at Hedon Church; stone from the Isle of Wight was brought to Winchester for the building of the cathedral. Marble from Carrara was brought to Genoa for the churches; from the mountains it was carried down to Milan for the cathedral, and from over the sea it was brought to Venice to veneer the native brick walls of the palaces and churches; whilst to a great part of England it was carried from Petworth and Purbeck. So (if it is not out of place to quote it here) goes the old tradition about the glorious Tower of Probus. To account for its possession by so poor a place, it is said that it was ordered in foreign parts, put all aboard of a ship, and—fortunately for Probus—brought by unskilful mariners there instead of to Truro, for whose church it was intended. But, in spite of such cases as these, as a rule it is true that every architect wrought in the material which was nearest to hand, and in so doing dignified his art by proving that no material which God had provided was unworthy of it. Honest, however, as the artist may be, there can be no doubt that the possession of a good material is of vast importance to the architect, and consequently that we, who enjoy such unbounded power of carriage and importation of fit material, must be judged in our work by a far higher standard than that which can fairly be applied to many of our forerunners. I have often felt, and I doubt not my experience is that of most of you, the strength in design which the power of using freely a good building-stone gives. I declare that when I am using a good stone, in the neighbourhood of the quarry, where there is no extravagance in being choice in one's mode of using it, there is a sense of freedom and power, a feeling of life in the knowledge that one's work will last for centuries, which enables one to design with a degree of happiness and delight which in other cases is almost wholly absent.

So it was in the Middle Ages. A good stone country produced good masons; they produced from time to time excellent master-masons; the country about them became proud of their work and gave them plenty to do, and so from age to age they produced a succession of buildings all worthy of our admiration. How should we have had Wells and Glastonbury without the quarries at Doultong, or Peterborough without the quarries at Barnack, or Lincoln without those at Haydor, or York and the Yorkshire abbeys without similar magnificent supplies of building stone near at hand? It was difficult to build badly with plenty of good stone to build with. The dignity of the material was a safeguard against utter badness of workmanship; and so the best art in England and elsewhere is found nearest to the best stone quarries.

But at the same time it is very much to my point that wherever such quarries did not exist, or wherever stone could not be procured in the neighbourhood, there the artists did their best at once to make the most of the other materials available.

Throughout Europe the early architecture was the work of stonemasons, and the carpenter and the bricklayer were but little esteemed. But when in the Middle Ages other materials had to be used, there arose the first opening for a difference of style caused by a change of material. Take the case of a granite country—go to Guernsey for instance, where granite was plentiful, and where there was no timber to be had, and you find buildings expressly contrived to meet this state of things. The churches are long narrow buildings; very rude in style, of course, because the granite was intractable; covered with arched roofs of rough granite carrying the outer roofing without the aid of any timber; the walls of necessity very thick in order to support the weight of the roof, and the windows, doors, and arches plain and rude, because polish and finish in such a material was almost impossible. With all their rudeness, however, these Guernsey churches are full of interest and character. Allied to them in construction are some far-away churches built under similar conditions. Such I believe are to be found in Wales, and one of the most interesting description has come under my notice at Bolton, in Cumberland, where the same system of an arched roof resting on thick walls and carrying the external roof is also seen. St. Cormack's Chapel, on the Rock of Cashel, is an Irish example of the same sort; and on the Continent the examples are very numerous of churches into whose construction no timber found its way.

Take for instance the churches of Auvergne or Périgord. Here we see an attempt made to construct buildings which should be as imperishable as the material of which they were built would allow. And whether (as is probable) because no timber was to be had in those bare volcanic districts, or whether solely on principle, the attempt was made to use stone alone. Perhaps those early builders saw what we do not usually seem to believe, that the use of one material alone is the surest way to building for posterity. Building with stone and timber at once is convenient, but, at the same time, it involves the certainty of ultimate decay; whilst building in metal and stone makes that decay a matter of the near future. That these French buildings were nearly imperishable is proved by their perfect state of repair even now. They were first of all covered with stone domes or vaults, and then these were covered externally with large slabs of stone. The consequent effect upon the design of the buildings may easily be seen. Their construction involved enormous walls to support the weight of the central vaults, and of half barrel-roofs in the aisles—forming continuous flying-buttresses—to support the central vaults; and so we have in this class of churches buildings entirely different in most respects from those which were built in our own country at the same time.

Then again, to take another material, observe how very much the use of flint in various parts of this kingdom affected the style of design. In flint districts stone was scarce, and builders, who had to import their stone from the quarries at Caen or from some far-off part of their own country, were obviously likely to be very economical in its use. One possible economy was the erection of buildings with as few quoins as possible. Hence we find among the Norfolk churches several in which the towers are

circular in plan, and in which * accordingly the cut stone is reduced to a minimum. At Welford, in Berkshire, is a similar tower, and so built for the same reason. Again, the use of flint, when it had arrived at the perfection which we see in the fourteenth- and fifteenth-century work of the Eastern Counties, led to the inlaying of stone with flint in a way which is certainly not only most skilful, but also most effective. Such examples as the Erpingham and Palace Gates at Norwich are evidences, among many others, of an important development of design owing wholly to the use of a particular material.

Another development with flint was the arrangement of the wall-face in a diaper, formed of regular squares of stone and flint. This is a mode of work not often seen in the Eastern Counties, but common in Hampshire, Dorsetshire, and Wiltshire.

The old builders seem often to have doubted the stability of flint walls; and accordingly I have found that whereas the old mortar is by no means too good in stone countries, it is often most admirable in flint districts. I believe it was used hot,† and that the flint-work so laid will last for ever. In the steeple of the ruined church at Garboldisham, the parish authorities have tested the old work by trying to remove the tower in order to find materials for road-making. But when they had blasted away the whole of one angle near the ground they desisted in despair, and the tower, still standing unaffected by the removal of a fourth of its base, is pretty good evidence of one effect of building with flints,—where the builders were determined to do their work honestly and soundly, and to use good mortar.

Again, I suppose you are all aware how much the use of brick has affected the art of design wherever it has been adopted. The great fields being (i.) the north of Italy; (ii.) the north-east of Germany; (iii.) the west of France; and (iv.) various parts of Spain. Nothing in the whole history of our art is more curious. The architecture upon which almost all Northern art was originally founded was, as I said just now, the work of stonemasons. But as new ground was covered by architects they came constantly to districts abounding with good brick-earth, but almost destitute of stone. And they found themselves, therefore, under the necessity of making the most they could of the only really available material. But the various schools of architects who had to deal with this problem were far separated from each other, had no natural or easy means of communication, and do not appear to have known much, if anything, of the brickwork which was being done elsewhere.

Their developments, indeed, were different, but they all agreed in the discovery of certain properties in bricks. In the first place they all found that if brickwork is to be strong it must be built with an enormous quantity of mortar, and so instead of specifying, as we sometimes do, that “no mortar joint is to be more than a quarter of an inch thick,” I think if we could find a mediæval specification we should find it run in this form, “no mortar joint to be less than half an inch thick.” Next they observed that

* If this is an expansion of the circular towers of Norfolk, it is not the only one.—A. E. S.

† In the course of the discussion which followed, it was stated that hot mortar is still used in Norfolk for flintwork.—A. E. S.

bricks might be moulded, and that if the earth used were well-tempered and fine, any delicate pattern might be reproduced in a hard material, which would almost defy weather. In subsequent times we have seen it become the fashion to ignore this view of the question, and to regard brick as a material which ought to be so soft as to be cut and rubbed easily. The existence of a mould was of course a temptation to use a pattern over again as often as possible. The result of this was that in most brick districts we see moulded brick traceries used and repeated all over a building, not because they were very beautiful or because they were required, but because they existed and therefore had to be used. Look at the cornices of the Italian churches, with their endless repetitions of the same form of tracery, and you will see what I mean; whilst in North Germany the traceries all over the transepts of St. Katherine at Brandenburg show precisely the same kind of result. Still more curious is it that in Italy, in France, and in Germany, the use of brick led to the erection of sham fronts in front of the roof gables, the main or only use of which was to show off the variety of moulded bricks. You will see a close affinity in cause and principle between such fronts (to take typical examples from each country) as those of the Town Hall at Lübeck, the gables of the churches in and near Toulouse, and the transepts of Cremona Cathedral, whilst, nevertheless, each is entirely independent of the other in style, and evidently their architects knew nothing of each other's work. And here I am reminded of the curious effect of this brickwork upon stonework in the same districts, as, *e.g.*, in Venice, where one cannot look at such traceries as those of the Madonna dell' Orto, consisting of groups of quatrefoils cut out to fit an arch, and not growing naturally as our own English traceries grow, without seeing that the necessary repetitions of brick traceries had probably suggested them. So again in North Germany we see at Brunswick, Halberstadt, and in that district generally, a remarkable type of west front, consisting of a raised gable between two towers, the sole object of which seems to have been the exhibition of magnificent traceries both to the east and the west, which looks almost as if it had been suggested by the common exhibition of magnificent brick traceries in the churches not far off, as, *e.g.*, in the transepts of St. Katherine at Brandenburg, though no doubt the Romanesque examples of the same arrangement would rather militate against this theory. In the South of France, in Toulouse and its neighbourhood, the use of brickwork led to almost exactly the same kind of developments, as one may see in the front of the church of the Taur, Toulouse, or that of Villefranche, not far off; but though the details of the work in all these districts are different, yet in each the style has been affected by the material, and is quite unlike what it would have been if stone had been available for use.

Again, what a complete change was effected in architectural design where wood only was available for buildings! In this country, there were certain districts in which oak was wonderfully plentiful in the Middle Ages. Such were parts of Hampshire, Worcestershire, Montgomeryshire, Cheshire, and Lancashire. But in all parts of the country wooden buildings were very common, and at the present day

there still remain, I believe, a vastly larger number of mediæval domestic buildings of this material than of stone.

The material here, as before, influenced the system of design most decidedly. The wooden building, framed together, not only admitted, but required for protection from wet, those projections of one storey over the other, and of the roof finished with a barge-board over the uppermost, which make all old wooden constructions so picturesque and beautiful in their outline. It is worthy of notice also that where oak was very plentiful it led to important developments of design. Compare, for instance, the magnificent roofs of Worcestershire and Montgomeryshire with those of Essex or Kent. In the former enormous timbers were available, and so the great principals of the roof were cut into bold arches, and their spandrels pierced with foliated openings of varied design ; whilst in the latter, where the timber seems to have been much smaller, the roofs are generally formed of tie-beams and king-posts, and with no large curved timbers whatever. An admirable example of one of these wooden churches came under my notice some time since at Hartley Westpall, near Basingstoke ; it dates from the fourteenth century, and the walls were formed of oak uprights grooved so as to hold securely a filling-in of mud or cobwork, which thus formed a fairly weather-tight construction. The then Bishop of the diocese protested against any attempt, on my part, to reconstruct the chancel in the same material, "because it would not stand ;" yet here was a building five hundred years old still standing, and I doubt whether one out of fifty of the churches his Lordship has consecrated will last half the time.

I must not go more into detail on this part of the subject, but must hurry on to the next head under which I proposed to deal with it, viz., the influence exercised in certain districts by exceptionally gifted architects. This alone is a subject which might well occupy us for the whole evening. It is true that our first scientific writer upon English architecture—I mean, of course, Rickman—did attempt indirectly to go into this subject by showing similarities between buildings of the same age. But since his time little has been attempted, and I shall only say just enough to induce some of you, maybe, to follow up the same sort of enquiry in districts with which you may happen to be familiar. Of course, in the Middle Ages, just as now, there were great differences of style and great diversity of power in the works of various architects. Men were never all giants, and those wonderful Freemasons of old had no more power of securing invariably good designs, than their humbler namesakes of the present day.

As a rule each man's work will be found in one district. Sometimes it is the cathedral which sets an example to the diocese. Sometimes it is an architect brought specially for the work from a distance ; but I am persuaded that a careful examination of the various works in any neighbourhood will show such evidences of unity of design and similarity of system, especially in the accidents or tricks (so to speak) of design, as would enable us to classify them with the same sort of ease with which we are at this day able to detect the hand of all our better architects in their various works, or in the sister art of painting to detect the manner of some old painter in almost every picture that we see.

So far as I have been able to ascertain, it seems that in the Middle Ages architects were very much in the habit of repeating themselves. One reason for this was, no doubt, that it was possible for them to be ignorant of other men's works, or other developments of art going on in their own neighbourhood, to a degree which is quite impossible in these days, when our art has become cosmopolitan instead of being individual. Let me now give you a few examples of groups of works done by the same artist. I shall take various cases, and rather at random.

We will begin with Westminster Abbey and the well-known church of Stone near Dartford. Here, as I think I proved in an account of Stone Church which is, I believe, in the library* of the Institute, there are pretty conclusive evidences that the architect was the same as that of Westminster Abbey. The points of similarity are as follows:— (i.) The arcades round the chancel of Stone and the chapels of Westminster are nearly identical both in the shape of their cusps, the character of their mouldings and sculpture, and the peculiarities of their detail. (ii.) The tracery in the triforium of the eastern part of the nave of Westminster is almost identical with that of a window which I discovered in the north wall of Stone Church. (iii.) The sculpture of foliage in the two churches is curiously similar. The enormous dog-tooth enrichments in the north transept triforium are repeated in the chancel arch at Stone; the roses round the north transept doors are repeated in the north door of Stone, and the cross in a quatrefoil over a doorway in the eastern cloister at Westminster is repeated in some quatrefoils which I discovered in the east wall of the nave at Stone. Finally the materials used in the two buildings are similar. No doubt these similarities in themselves are very convincing; but what is still stronger evidence to my mind of a common author for both works, is that both, dissimilar as they are in first appearance, are planned on the same system of proportion founded on the equilateral triangle.

In the *Ecclesiologist* [vol. xi. p. 31] there is a Paper of mine in which I tried, and I think with success, to prove that the churches of Merstham, Chipstead, Cliffe-at-Hoo, Brasted, and Merton were all built by the same architect. The evidences of common origin were generally small similarities of detail, and it is in these that you will usually detect the same man's hand of old just as at the present day. Another curious case is that of Bristol Cathedral and Yatton Church. Here the columns between the Bristol choir and its aisles are lofty, and carry very acutely-pointed arches, whilst those of Yatton tower are low and altogether different in proportion. Yet the detail of the fine mouldings which form the clustered shafts at Bristol is exactly reproduced at Yatton, being wrought from the same moulds. The south transept window at Yatton is similar in style to some at Bristol, and this serves to make me think that we may fairly credit the architect rather than the mere stonemason with the similar details of the piers.

Another group of thirteenth-century churches—this time on the south coast—may also be given to one and the same hand. Any one who knows Chichester Cathedral well

* *Some Account of the Church of St. Mary, Stone, near Dartford.* Reprinted from *Archæologia Cantiana*, vol. iii. Pamph. 8o. Lond. 1861.

would, I think, be convinced; if he were to visit the Church of St. Thomas, Portsmouth, that its choir was certainly the work of the same architect. And if he went from thence to Wymering, he would, I think, soon perceive that the delicate little columns which divide the nave from the south aisle there, are derived from the delicate columns at Portsmouth. Hayling and Warblington Churches, in the neighbourhood of Wymering, have some evidences of being the work of the same man. The magnificent Garrison Chapel at Portsmouth built at the same period is much more similar to the work of Bishop de Lucy, at Winchester, than to the other buildings.

Wantage and Bampton Churches have nave arcades which correspond as exactly in detail, shape, &c., as two works can well do. They seem to have been worked from the same moulds. Heckington and Navenby and Hawton are three Midland churches all by the same hand, as the sedilia and Easter sepulchres sufficiently prove.

Three churches in Derbyshire and Staffordshire—Norbury, Blithfield, and Checkley—have chancels of the fourteenth century, which are singularly alike in character; they are all fine works, full of good detail, and well preserved. Their windows also retain a great deal of very fine contemporary glass; that in Blithfield and Checkley is of the most delicate kind, whilst that at Norbury is coarse and inferior. It follows that, if, as I suppose, the chancels were designed by the same man, he did not design the glass, for it is clear that the coarse detail of the windows at Norbury could not have been drawn by the man who drew the detail of that in the other churches; or executed in the same workshop. Probably some of this glass was done by some firm who (as they do now) supplied church decorations everywhere. That such things were done we have curious evidence in the case of the decorations of the Norfolk screens; you know how frequent, though perhaps few of you know how exquisitely beautiful, they are. It turns out on examination that the figures on these screens are sometimes painted on *paper*, and then pasted on the panels, that the same patterns and figures are repeated on different screens, and that the same designs for figures of saints are in some cases found upon the screen in one place, and in the stained-glass window of another church. This is a valuable sort of evidence, because it serves to show that customs of trade, which we are apt to suppose to be modern, are in truth old enough for any one. And it accounts in some degree for the excessive similarity of the detail of many kinds of old decoration. Who, for instance, can examine the splendid screens in the neighbourhood of Taunton without perceiving that they were for the most part executed in the same shop under some one man whose skill had made him famous? So again, in the case of the carved ribs and purlines of the Cornish roofs, the similarity of workmanship and detail is so great that it looks very much as if the workmen who executed them were all taught by the same master; and in the case of inferior workmen there is, I believe, some evidence that the iron grille of Queen Eleanor's tomb at Westminster, the hinges on the door of Leighton Buzzard Church, and the hinges on a thirteenth-century door in St. George's Chapel at Windsor, were all executed by a smith of Leighton.

The value of this examination of buildings erected by the same men or under similar influence was well illustrated in the restoration of Merton College Chapel, Oxford.

The chancel of Trumpington Church near Cambridge is evidently the work of the man who built the choir of Merton; and, if I remember rightly, there is some connection between the College and that parish which makes this supposition very *vraisemblable*. Therefore, when Mr. Butterfield had to restore the chapel of the College he was perfectly right to go to Trumpington, where the original roof still remains intact, to learn what the proper form of roof would be; and what may strike many as the peculiar roof of Merton Chapel is in truth a mere copy of the roof of Trumpington, and, therefore, justified by authority.

The influence of particular artists upon the style of entire districts was sometimes no doubt very great. Few counties exhibit this better than those in the west of England. Examine the churches of Cornwall, for instance, and you will find this most remarkable fact—that in the fourteenth century all the churches were cruciform in plan, with western towers and spires, whilst in the fifteenth century they were equally invariably planned with three parallel aisles, and with western steeples *without* spires. It is very difficult to account for such a marked change, and I confess myself quite unable in this case to do so. But of the fact there is no doubt. There is perhaps some clue to the style of the fourteenth-century churches in the evident similarity of their details throughout, which seems to suggest that they were erected by the same man or body of men. Also the influence so often exerted by the erection of a grand cathedral may have had its weight here; Exeter Cathedral is the kind of building which must have created great interest at the time of its erection, and the style of its window traceries is somewhat similar to that of the windows in the Cornish churches of the same age. The characteristics of these churches are so remarkable that I may as well enumerate them. They are, as I have already said, cruciform, and, except in the case of large churches, without aisles. They have no chancel arches. Their piscinæ are constantly in the east walls; the founders' tombs are in the end walls of the transepts, and the window traceries are almost always formed with the same leading lines. Finally, the architects at this period used good building-stone for their work, wrought it well, and would have nothing to do with the hard intractable granite which was so plentiful everywhere around them. For some reason, in the fifteenth century all this was changed. The churches were universally planned in a different way—so much so that I doubt whether a single example can be adduced of a cruciform church in Cornwall in the fifteenth century; their material was always granite, not stone, and their workmanship was as rough and rude as in the preceding century it had been refined and delicate in character. The carpenters in these parts, it is true, at this period were skilful; their roofs were covered with rich conventional carvings of foliages, and their open seats and screens were as gorgeous as labour could render them. But here again, as I said before, the similarity in all the details throughout the county is so great and exact as to lead naturally to the conclusion that one man or one body of men had an extraordinary influence on all the woodwork executed during the period. It is a subject, therefore, which suggests and justifies the most careful enquiry, because it seems just possible that here, owing to the geographical configuration of the county,

we have a case in which it might be possible to prove the existence of a distinct order of Freemasons, by whom, in accordance with certain fixed rules, all the work in each period was executed, though at the same time it is clear that if Freemasons *were* employed they limited their travels to a very small district, and never carried their art out of their own county. The same thing may be seen to some extent in other parts of England. Take Norfolk, for instance, and you will find one example after another throughout the county of fourteenth-century stonework, in which a style of flowing tracery is adopted and brought to the greatest perfection, of which it would be hardly too much to say that examples are not to be seen out of that part of England. So again in the fifteenth century in the same county there was an absolute passion for clerestories crowded with windows—two to each bay—and hammer-beam roofs to the naves, whilst the aisles were also roofed with arched principal-trusses whose spandrels had delicate and varied open traceries. Here, too, spires were little esteemed, whilst in Northamptonshire and Lincolnshire he was wrongly thought a very incompetent artist who did not erect one in every church ! Go, again, into Sussex, and you will find in the thirteenth century an extremely beautiful and simple type of village church ; it has the most delicate lancet windows, excellent though modest proportions, and that kind of singular delicacy in all its details which reminds one of the refinement and simplicity of such work as Simone Memmi's in the sister art of painting.

In truth it is hardly too much to say that every county in England has its own distinct variety of Gothic architecture. And these varieties, where they were not caused by the presence of a particular building-material, were mainly due to the influence of particular architects in various ages. The genius of the architects of Lincoln Cathedral in the thirteenth and fourteenth centuries was directly reflected by the beautiful churches which studded the flats over which the minster so proudly looked from its hill of strength. The glories of York Minster and St. Mary's Abbey (now, alas ! all but destroyed) are equally reflected in a Fountains, a Rievaulx, a Whitby, a Kirkham, a Bridlington, and a Beverley—any one of them a treasure of which any kingdom might be proud, which here are found close to each other, and all of them designed in a style full of peculiarities of detail, which prove their architects to have been local men, and not versed in the work of the same age in the south of England. Look again at the Somersetshire towers, and see how evidently they were the offspring of one mind, or again at the much simpler Devonshire towers, with what Rickman calls their "Devonshire" pinnacles. In Warwickshire, in Staffordshire, in Derbyshire, in Cheshire, in Kent, in Wiltshire, in Oxfordshire (where Christ Church Cathedral set an example, followed at Witney, Bampton, Faringdon, Uffington, Wantage, and Lambourne), and in many others, the most distinct evidence of the influence of local artists on the buildings is conspicuous even to a superficial observer.

If we leave England we shall find in every direction the same evidence of work by the same hand, generally in one district, but sometimes in places far apart. You all know what influence France exercised in England in the person of the great architect of Canterbury Cathedral, William of Sens ; or Italy on North Germany, in

the copying of San-Vitale, Ravenna, at Aachen. In the same way, when the vast Cathedral of Santiago de Compostella was to be founded, its architect seems beyond a doubt to have derived his inspiration from the Church of Saint-Sernin, Toulouse. The plans of these two churches are remarkably similar; while still more striking is the fact that the sections of the two churches are not only absolutely alike in construction, but also designed upon the same system of proportion of height to width. And it is curious that between Toulouse and Santiago, the breadth of Spain apart from one another, there is no church founded on the same plan, all the other churches of the same period having, in place of a regular *chevet* with surrounding chapels, a system of parallel apses on the east of the church. In the churches at Lérida, Tarragona, Tudela, and other similar examples at Benavente, Salamanca, and throughout the north of Spain, the influence of a foreign hand is seen, but it is not the same hand which busied itself in the design of Santiago. And by way of parenthesis, let me call your attention to the exact similarity of the clustered piers in all these examples, a similarity which is carried out in all the other details.

At later periods it is equally certain that foreign architects imported their Northern art into this Southern climate, and Toledo, Leon, and Burgos Cathedrals are distinctly the works of foreigners, brought from various parts of France for the purpose, and with no transitional works on the soil leading up to their perfect development. Toledo alone, I think, shows in its original design any evidence of the effect of the national art upon the architect; for here in some features, and notably in the design of the triforium of the choir, it seems as if the popular architecture of Toledo—which was Moresque long after the Moors had ceased to rule—had slightly affected the French architect. Another evidence that these churches were the works of architects unfamiliar with the country may be seen in the failure to adapt their work to the climate. It is indeed strange to what an extent this mistake was perpetrated. Romanesque architects all over Europe built with window openings suitable to an Italian sky, but quite unsuitable to German, French, or English skies. Their mistake was corrected as time wore on by the development of native artists. But as soon as these in their turn left their own land to build churches abroad, they built just as they had been used to build at home, so that, *e.g.*, at Leon we see a cathedral which is window from one end to the other, as if the only object in a hot country was to let in as much sun as possible; while exactly the same mistake was made by the German architect of Milan Cathedral. Gradually in Spain, as elsewhere, the influence of native artists—first among whom is Jayme Fabré of Mallorca—is seen in the design of the fifteenth and sixteenth century churches, where the windows are as small in proportion to their area as those of the old Romanesque buildings, and carefully adapted to the climate of the country.

It is a little difficult to find evidence of any intentional copying of one man's work by another, or of a distinct recognition on the part of employers of the advantage of such a course. But this is solely because we have so little documentary evidence of what happened in the Middle Ages. Depend upon it, they were much more like our

own times than we are prone to think. Take the story of the building of the cathedral tower at Valencia. Here we have it in evidence that by a deed made on the 18th May 1414, before the notary of the chapter, it was settled that one Pedro Balaguer, who is termed "an able architect," should receive 50 florins from the fabric fund of the new Campanile, "in payment of his expenses on the journey which he made to Lérida, "Narbonne, and other cities, in order to see and examine their towers and campaniles, "so as to imitate from them the most elegant and fit form for the Cathedral of "Valencia." The result of his journey was a design which, though it differs now considerably from that at Lérida—having been very long in building—is still founded upon it; and that his course was not an uncommon one may be judged by the fact that in this part of Spain the steeples of the fourteenth and fifteenth centuries are almost always octagonal, of the same type, and derived originally, I am inclined to think, from Romanesque examples, which in this part of Europe were generally polygonal.

The steeple builders of Valencia were not peculiar. If we turn to Caen we shall find a very remarkable example of the same kind of imitation* by one architect after another, of an admirable early type. So far as I know, the earliest examples of these beautiful spires is one of those at the west end of the Abbaye-aux-Hommes. Here the ingenuity of the spire builders was such that they crowned the two Romanesque steeples with two designs for spires, differing from each other in important particulars, yet harmonising admirably together, and each of them full of ingenuity in plan and design. These spires fructified amazingly. They were wedded to steeples whose belfry stages consisted of an arcade of four, the two central arches alone being pierced. Of all designs for spires they are among the most beautiful that I know, but they are purely local, their habitat being Caen and its neighbourhood, with off-shoots extending westward as far as the famous Notre-Dame-de-Kreizker at Saint-Pol-de-Leon, and for aught I know farther. But the remarkable thing here is, how the thirteenth-century architect influenced, not only the men of his own day, but also those who followed him for three centuries.

And here let me notice the remarkable way in which a passion for building domical churches affected certain localities. Whatever the exact truth may be about the Venetian colony at Périgueux having introduced the dome into Périgord, there can be no doubt that from thence it ramified into all the surrounding district, without in the least degree affecting other provinces. Cross the Pyrenees and you will find in the three neighbouring churches of Salamanca, Zamora, and Toro, examples of another attempt of the same kind of which I know no other examples, and which must all have owed their origin to the fancy of some one architect, for there is nothing leading up to or suggesting them in older works.

The ground-plans of some buildings appear to me not unfrequently to show evi-

* "These do not show such differences among themselves as to entitle the later examples to be called "original. They are all copies, with little alterations in the details." Stated by Mr. Street in the discussion which followed the Paper.—A. E. S.

dences of the same hand in their design. Many of you know—all ought to know—the beautiful Liebfrauenkirche at Trier, or Trêves. Its plan is, in my judgment, one of the most beautiful ever devised; so simple, so well proportioned, and, in spite of its real simplicity, so intricate from some points of view. It is truly a *chef-d'œuvre*. If you compare its plan with that of Saint-Yved at Braisnes, I think you will agree with me that it was by no freak of fortune that the two churches were designed so exactly on the same lines. You will see that, if you draw a line through the centre of their transepts, the portion to the east of the line is alike in each. Either one was copied from the other, or they were both designed by the same man. If this last supposition is true, how interesting the fact becomes when we look at the different character given to the two buildings by the planning of their western portions—that in the Liebfrauenkirche completing a circle by the repetition of the eastern half, and that of Braisnes taking the usual shape of the normal nave—whilst in the designs of the elevations there is little similarity, one church having a triforium, whilst in the other the clerestory is begun immediately over the arcade arches. In a church at Metz—my notes of which I have unfortunately lost or mislaid—we see, as nearly as may be, I believe, the same plan, with again a different treatment of the elevations. And even if these churches are not by the same hand they show at any rate very well how imitation of one man's work by another led to very interesting graftings of one scheme upon another. The district in which these churches occur seems to me one of special interest to us in pursuing the kind of study I am recommending. You know how our Northern Gothic developed from two streams of Romanesque and Byzantine art, the one following the course of the Rhine, the other travelling northwards by the valley of the Rhône, and by Aigues-Mortes, Toulouse, Périgueux, and Poitiers. The former maintained its sway much longer than the latter, which soon passed through one phase after another of ever-vigorous life, culminating in the noble thirteenth-century art of the Île-de-France. But after a time we see the German architects and those of the Île-de-France gradually influencing each other, and a style arising from the contact of their different systems, which has a character entirely its own. The churches I have been just mentioning are one evidence of this. So are most of the churches of Lorraine and Champagne—notably the grandest of them, Laon Cathedral. If you compare the steeples of Laon with those of Bamberg Cathedral, you will, I think, see the connection, and will agree with me that on both sides of the Rhine you have a joint influence—on the east, the French affecting the German; and on the west, the German in his turn affecting much of the eastern part of what we call France.

I now pass on to another part of my subject. The third way in which I said that changes might come over national schools of art, was by the movements of trained bodies of men, such as (i.) Freemasons, or (ii.) Religious Orders. I must confess that I do not much believe in the former. But that masons forming guilds or confraternities, ruled by trade rules, and then, just as now, very nomadic in their habits, may have exercised a large influence on the art of entire districts, cannot be doubted. All the evidence which I have been adducing, and which old buildings

exhibit to my eyes, is against the belief that masons travelled very far afield. The masons of old preferred working in stone to which they were used, just as they do at the present day, and so they seldom, I believe, travelled beyond the limits to which their favourite stone was carried. But in the case of Religious Orders, I think we must all agree that there was at least a great likelihood that their frequent connection with foreign houses, their habits of travelling, and the like, should lead to a considerable infusion of foreign art wherever they existed. But, besides this, there is the more important fact that some of the great Religious Orders had precise and exact rules as to the shape and relative position of most of the buildings which went to form the vast whole of a mediæval convent. The example of the first Cistercian house in Spain is much to the point. Here—at Veruela—we have a church and convent planted on the further side of the Pyrenees, and beyond all question showing, both in the plan of its church, with its beautiful *chevet*, as well as in what remains of the conventual buildings, an exact compliance with the rules as to building of the mother-church of the Order at Clairvaux. Nor could this be wondered at when we know that the first monks of Veruela were Frenchmen, and took with them, no doubt from Clairvaux, their master-mason as well as all the other necessary officers.

May we not account for the very foreign character of such a design as that of the porch in front of Fountains Abbey, and the arrangement of the vaulting in its aisles, in a somewhat similar manner? Fountains had a most intimate ecclesiastical connection with the south of France, and what more natural than that one of its abbots should have tried his hand at importing something like one of those southern cloisters of which every one can feel the charm?

Closely allied to this sort of influence is that which was caused by conquest or colonisation of one country by another. As a rule, conquering people bring the arts with them, and perhaps Spain affords a solitary example of a race dominant after a fierce struggle, employing the defeated enemy in the arts in which he was proficient. Yet this was the case wherever the Moors continued to dwell after the Spaniards had regained dominion in their land.

In England there can be little doubt that we owe much of our art to the success of the Norman invasion, whilst Ireland and Scotland afford remarkable cases of purely foreign art introduced into portions of the country. In Ireland you find the most pure South English art in almost all the buildings erected within the English pale. In Scotland you find churches of the finest design, such as Elgin, Arbroath, Holyrood, Dunblane, and many others, evidently built by English architects and in the best and purest way. And in Spain, whilst the contest with the Moors was going on, people were too hot-blooded to have time for aught but war, and you see French bishops going to fill Spanish Sees, and taking with them French architects to build cathedrals in their own French style.

The great convent at Assisi is a case of curiously mixed origin: I believe its architect was a German, but if so he was one of those who lived near France, and was much influenced by French work; so that its origin is doubly complex.

The church of St. Andrew at Vercelli is a case which has been often quoted. It is talked of as an English church built by one who had been ambassador for many years in England. In truth there is nothing whatever English in its character, but much that may be French; but at the same time local workmen or architects have largely modified the design of the exterior to suit Italian eyes. No doubt Cardinal Guala had learnt to admire Northern Gothic during his long sojourn in the North of Europe, and aimed at introducing a new style into his native country; and his work is interesting evidence of the eddies and back currents which led the stream of art back again oftentimes to its source. In the first ages of mediæval art the whole progress was from South to North. But as the vigorous natives of the North mastered and developed the principles of the art, here and there the stream turned again, and so not only do we see German traceries in the little mountain churches on the southern slopes of the Alps, but we have also a Milan, a Genoa, a Vercelli, an Assisi, as well as the still more distant works executed by the Normans in Sicily, and the Aragonese in Naples, of which I cannot speak, save by hearsay.

In the case of such a church as St. Mark's and some of the early palaces at Venice one cannot doubt that the design and detail is almost entirely Eastern. But these early Eastern buildings at Venice largely affected the character of the later Gothic into which her architects developed; and then when the style was well fixed there, you see it transplanted to some places in the immediate neighbourhood, but never travelling very far, so that to the end it is a local variety, peculiar to a small district. In Vicenza alone does one see a whole city copying and building exactly after the Venetian fashion. There is literally no difference between the type of palace common in Vicenza and in Venice in the fourteenth or fifteenth centuries, and yet when you travel a few miles further you lose all evidence of the work of this particular school of architects. The development of the Venetian domestic architecture of the fourteenth and fifteenth centuries is certainly one of the most remarkable cases of the tendency of men to follow in the grooves they happen to find prepared for them. In the Fondaco-dei-Turchi, in the Ca-Loredan, and in other palaces of the same age, so far as we can judge from all the fragments which remain, there was a distinction of a clear kind made between the centre and sides of the façade. The whole front was otherwise unbroken and uniform; but at the sides the windows or arcades were differently spaced to such an extent that no one could fail to notice them. Gradually as the fashion obtained of putting traceried windows in place of arcades, all Venetian architects nevertheless followed the old tradition, and arranged them with exact regard to the old rule. Here, just as in church architecture, it was the ground-plan which really created the design. It was a custom—as invariable as our British custom of having a back and front drawing-room, without which no matron is happy—to have in the centre of each Venetian house on every floor a hall out of which all the rooms opened. This hall naturally had a grand window at its end to light its whole length, and then the rooms on either side were lighted by smaller and simpler windows. This arrangement, which is first seen in the Byzantine palaces, and which, there can be little doubt, owed its introduction to the special taste

of some one artist, was copied and even more decidedly marked for centuries, and affected even the designs of the Renaissance palaces. It is a remarkable example of a local variety of style which never passed far from the land of its inventor.

It would be a most interesting subject of enquiry if we had time to make out exactly who were the artists to whom are owing the designs for buildings erected during the Crusades in the Holy Land. So far as I can judge, we have here a very strange illustration of imported art. I regret very much that, in part, want of special (*i.e.* personal) knowledge of Eastern buildings, and, in part, want of time, have prevented my going into this question as I hoped to have done. Here I will only say that there are certain peculiarities in the sculpture of capitals, in the detail of arch moulds, and in the general character of the design of these buildings, which show a very remarkable affinity to—I might almost say identity with—a certain class of European work which is to be seen nowhere out of the West of France and Spain.

The façade of the Church of the Holy Sepulchre is as absolutely Toulousian or Spanish as it can well be; the very arrangement of the two doors is peculiar; you see it in the transepts of Saint-Sernin at Toulouse, and of Santiago. The detail of the sculptured capitals is peculiar, and is repeated constantly in early work at Barcelona as in the old doorways of the cathedral, in San-Pedro, and in San-Pablo. The same character is seen in the gateway of a mosque at Nablous. The ruined Church at El-Biréh (the spot where the Blessed Virgin is said to have discovered that our Lord had stayed behind her) shows an arrangement of three parallel apses at the east end with carved capitals of the same character, and all its detail exactly similar to that which one meets in Languedoc. And it seems natural enough to assume, just as one may in the case of the English pale in Ireland, that all this art was imported into the Holy Land from the West of Europe, where it became grafted on and affected the national architecture.

I will only mention, to show that I do not forget it, the French influence which is visible in all the later Scotch buildings. There are some nations to whom originality in art has always seemed impossible. Let us assume—as perhaps we may—that nature has been too bountiful to Scotland to allow of her sons troubling themselves much about art. But, whatever the reason, it is true, generally speaking, that before the middle of the fourteenth century most of the Scotch buildings seem to have been constructed by Englishmen, whilst for the next two hundred years the fashion set in favour of a style founded certainly on the late French Gothic, even if not carried out by French architects.

There remains only one head on which I wish to detain you any longer now. This is the influence on style which is caused by attempts to copy in one age what had been done in some previous time. Now there was not much antiquarianism in the Middle Ages, but there was just a little. Antiquarianism on a large scale was indulged in only by the Rhenish architects of the thirteenth century. They must have purposely shut their eyes for many years to what was going on in the *Domaine-Royal* in the first half of the thirteenth century. They were proud of their old Rhenish

churches, and would not, without a struggle, give up their main features. So in such a church as that noble one at Münster-Maifeld, they deliberately retained many of the characteristics of a Romanesque church, along with parts and details every here and there which show an acquaintance with thirteenth-century Gothic.

In somewhat the same way architects in Spain were building completely Romanesque churches at the very same time that at Leon, Burgos, and Toledo French architects, brought there for the purpose, were building magnificent churches under their very eyes of the purest and most advanced Gothic.

Then there are many cases in which we find an architect of one period trying to conform his work to that of an earlier building to which he has to add. At Elne on the Mediterranean, near Perpignan, there is a case in point. Here there is one of those interesting and noble cloisters to which throughout that part of the world one is used. It consists of arcades resting on coupled shafts, and the shafts, the piers, the capitals, and the bases are all enriched with elaborate carving. At first sight one supposes that one has found a purely Romanesque cloister, all of light marble, and copied, both in general design and in the strange irregularity of its ground plan, from the not very far distant cloister at Gerona; but, upon inspection, it is quite clear that whilst the west and south sides are of the twelfth century, the east and north sides are of late thirteenth- or early fourteenth-century work, copied in general outline and design from the earlier work, though natural foliage is freely introduced in place of conventional.

We all know the case of Westminster Abbey, where, with what at first sight appears to be excellent judgment, the noble design of the earlier church was continued in the fifteenth century, with so much general similarity that uneducated eyes would not detect the difference. Worcester Cathedral affords another case of the same kind, for there evidently the architect of the nave tried to make his work harmonise entirely in its lines and general design with the thirteenth-century work of the choir. The results both at Westminster and Worcester are not encouraging; both of these attempts at copying are tame and uninteresting compared with what the unfettered work of their builders would no doubt have been; and they may well be compared with the design—almost inspired, one may deem it—of the nave of Bridlington Priory, where the architect of one side of the nave built upon an entirely different scheme from that which he found existing on the other side, and where, nevertheless, both designs being really full of life and fire and poetry, the eye feels no pain at the extraordinary discrepancies of detail where all is beautiful.

But there is, perhaps, in England, no example of copying so well worth study as that grand old out-of-the-way Devonshire church of Ottery St. Mary. Here we have a church which, though it was built late in the fourteenth century, with transepts formed by its two steeples in imitation of the neighbouring cathedral at Exeter, was nevertheless designed with a clear desire to hark back to earlier examples, and to imitate many of the features of the thirteenth century. So we see nearly all the windows either lancets or combinations of lancets, and so well imitated as to give the impression, until their detail is examined, that they are really the work of thirteenth-century

masons. Their detail, however, is so pronounced in all its features as to leave no doubt whatever as to the age of the work. And this leads to the observation which has been often made before, that our forefathers never knew how to copy exactly what they saw. Some men will tell you that because they knew not how to copy, we ought not to do so either; and that every one giving reins to his imagination should design just what liketh him best, without reference to antiquity or precedent. I venture to dispute any such suggestion most energetically. I see enough of other men's work, and know enough of other men's studies, to know that the most original and most admirable work is that of the men who have studied old buildings the most thoroughly. Depend upon it, the more you study old art the less you want to copy it, and the only way to escape from the necessity of simply copying is to devote yourselves with enthusiasm to its accurate study.

With purely antiquarian speculations I do not wish to advise any architect to busy himself overmuch, but I feel strongly that most of those who wish to make progress in their art must sacrifice a little, at any rate, to antiquarianism. They will discover by so doing not only much of interest, but at the same time much of edification, and they will most certainly find that the one feature which binds together all these apparently divergent varieties of Gothic building is that they are almost always planned in obedience to the then known best systems of construction; and that no architect can ever hope to create any differences of style in his own buildings worthy of admiration otherwise than by perfect obedience first of all to this first and foremost rule of all good architecture.—GEORGE EDMUND STREET.

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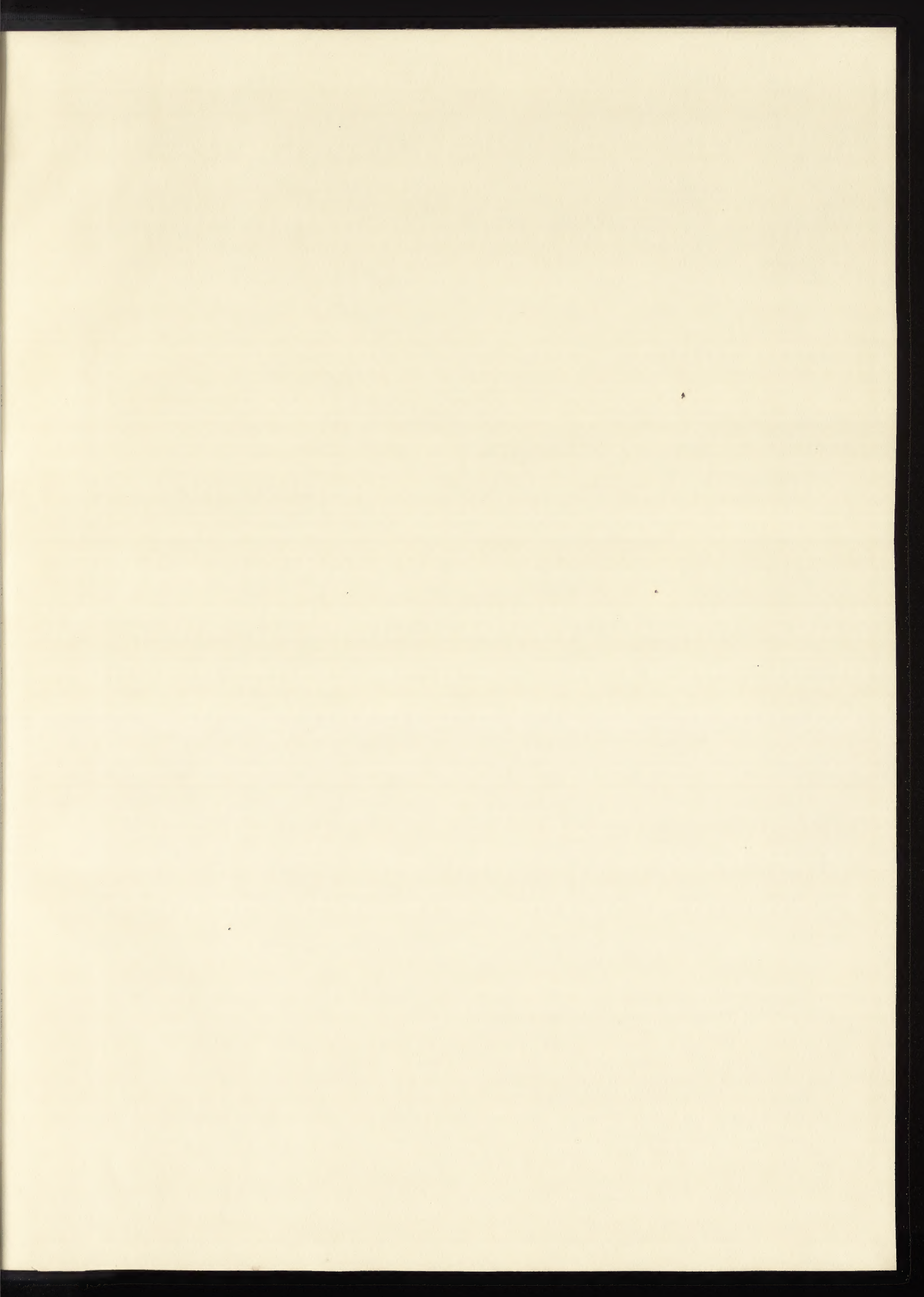
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